# EXCURSIONS AND LESSONS IN HOME GEOGRAPHY

McMURRY

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BY

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# PREFACE

It is customary in some schools to make excursions with children to study the geography of the home neighborhood.

The series of excursions described in this book furnishes a variety of illustrations in different localities of such trips with children. They are such excursions as are usually taken with classes in the third or the fourth grade. But while it may be well to emphasize the geographical excursion in these grades just beginning the study, an occasional excursion would not be out of place with children in any grade below the high school. In fact, some of the trips described were taken with grammar school classes.

A few of these topics, like that of gravel roads, may be discussed without an excursion, but in most of them the excursion would be a real help.

In this book our purpose has been to give the subject-matter rather than the method of managing the excursion, though occasionally hints are given on method.

The "Special Method in Geography," published by The Macmillan Company, has a somewhat full treatment of this whole subject of excursions and of the method of handling them.

In the present volume, illustrations of excursions in many different localities are given so as to show the varied scope of such work as adapted to different places.

Most of these lessons are illustrations or types of similar things found in other parts of our country. It is believed that twenty or more good topics having strong resemblance to those treated in this book can be selected in nearly every community.

It is not the purpose of this book to lay out any narrow method or any fixed body of topics, but rather to suggest variety and originality on the teacher's part. The great object of such observational study is to open the eyes of both teacher and pupil to the physical and industrial world in close proximity to them, and to find in these instructive things the simple and fundamental problems of life.

A teacher well acquainted through experience with this local material is in many respects well qualified for teaching geography.

PALATKA, FLORIDA,
February 15, 1904.

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# EXCURSIONS AND LESSONS

IN

# HOME GEOGRAPHY

FIG. 1.
The Normal School.

# EXCURSIONS AND LESSONS IN HOME GEOGRAPHY

## CHAPTER I

### LOCAL SCENERY AND VIEWS

#### Excursion to the Normal School Tower

The excursion with a class of third grade children to the tower of the Northern Illinois Normal School was designed to give a broad survey of the country about De Kalb. The tower is about ninety feet high and gives a good view, five or six miles in all directions, including prairie, woods, creek, the town of De Kalb, farms, fields, etc.

1. Before taking the trip the teacher made a visit to the tower and studied the surrounding country, thinking out a series of topics which would interest and instruct the children as observation material.

2. Just before the children began the trip, fifteen minutes were spent with the class on such questions as the following: At what places in De Kalb can one get a good view of the surrounding town and country? They mentioned a few such places, as the water-tower, the tops of some high buildings, windmills, and steeples. Name some of the objects which you

will be able to see from the top of the Normal School Tower. What else will you be able to see from this tower? How far can you see? Can you see your homes? How high is the tower? They named several things, — creek, railroad, bridges, water-tower, factories, homes, etc., and pointed, naming directions.

With these preliminary questions and discussions it was thought the children would be more acute and definite in their observations when the opportunity was given.

3. The children, about fifteen in number, climbed five stairways to the top of the tower, when they came out into the open, and quickly began to name and locate objects in one direction after another.

(*a*) In particular toward the south they notice the natural woods, the two bridges across the creek, the shoe factory, the creamery, the fields and farms beyond, and the distant course of the creek.

(*b*) Toward the north are seen the open fields and pastures, ploughed fields, cattle and horses, stacks of straw, corn in the shocks, and in the distance, six miles away, dimly, the water-tower of Sycamore, a neighboring town.

(*c*) To the east, across the creek, lies the town of De Kalb, with the stores, nine tall factory chimneys, several church towers, the water-tower, the gas-tank, and the clusters of houses. They notice also some of the streets and point out their own homes. Beyond the town they can see the farms and fields of the level country.

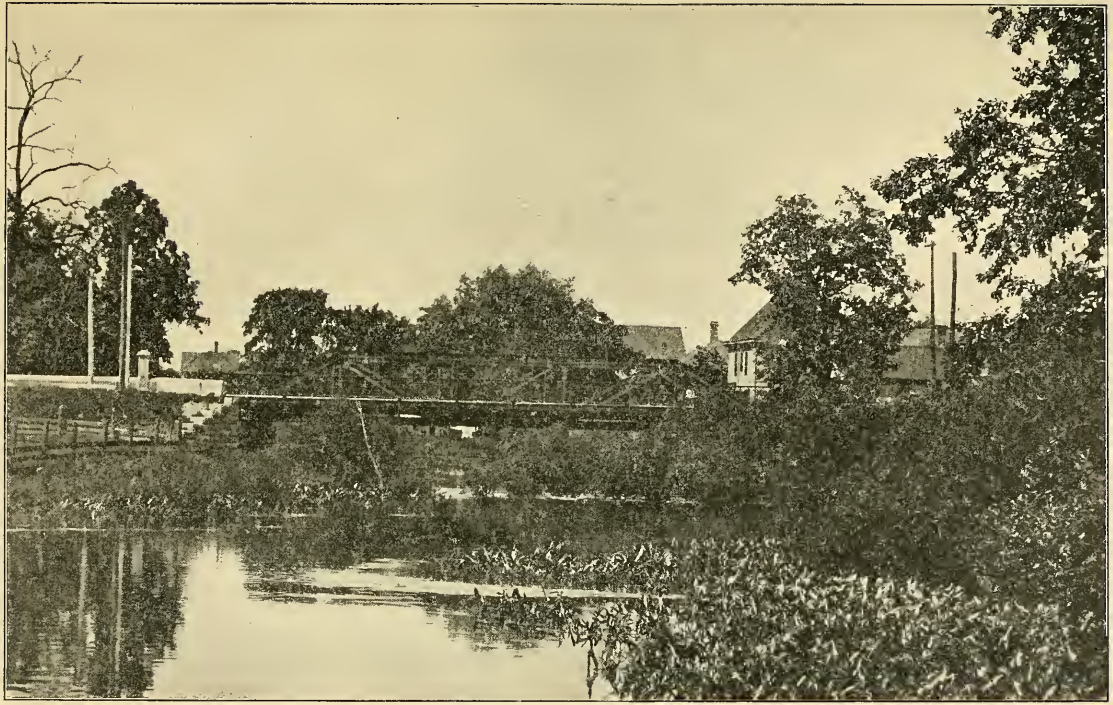

Fig. 2.
The bridge and the creek.

(*d*) The country to the west is a broad rolling prairie dotted with groves and farmhouses, with big barns and windmills. Stock is seen in the pastures, and the fields are mostly brown with autumn. The little creek or brook that passes through the campus can be seen in its course two miles or more to the west, also the slopes on either side. From these slopes comes the water that fills the brook at the time of the spring floods.

(*e*) The children call attention to the line where the sky and earth seem to meet and call it the horizon. How far away is it? What is its shape on all sides? How big a circle can we see across, with the tower as a centre? Can we see the whole county? The children notice the small size of objects like men or cattle, as we look down upon them.

(*f*) We notice that along the course of the creek to the east and north for several miles there are natural groves of hardwood trees. Toward the west lies the prairie, with only such groves and orchards as men have planted. Once it was treeless prairie. Toward the east also is the town with its smoking chimneys and crowded houses; toward the west the open country with its fenced fields and scattered farm dwellings, groves, etc. While the children are observing from the tower, they should be called together and asked specific questions about the things seen, so as to give definiteness to their observations; otherwise they will fail to see clearly the important things.

The next day it is found necessary to have a discussion of the experiences gathered upon the excursion. Let the children explain one after another the things observed in the four directions. To give definiteness to these reproductions have a large piece of drawing or wrapping paper laid flat upon the floor, upon which to draw a map with the schoolhouse and campus as the centre. The course of the creek is drawn also upon this, and the location of forest, city, fields, and all objects of interest noted. Let the teacher draw this map before the children, and have them explain the direction and the proper location of creek, bridges, railroad, water-tower, etc.

Let the children also give complete verbal statements of the things seen, with as little questioning as possible, using the five topics as a basis. The map can now be hung up on the wall, and the directions, fixed before in their natural position, still retained in this changed position. Somewhat later it may be well to make a more careful study of the slopes and to form a sand map which illustrates surface features. An excursion outdoors, along the little creek, to get the ups and downs, the hills and slopes, and the level flats near the brook, is advisable, as a preparation for the sand map. This will lead the children to observe more closely the arrangement of slopes and variations in level.

Later still it may be well to show the map of the state of Illinois, including De Kalb County, and thus bring their experiences about the home into relation

Fig. 3.
The brook in the school campus.

to the wall map, and then finally to the United States, and to the world.

After this preliminary board sketching a map of the town, showing a few chief highways leading out to the country and to neighboring towns, may be made by each pupil, applying a definite scale of an inch or half-inch to the mile.

The location and direction of the neighboring towns and the railroads connecting with them should be shown by sketches made by the teacher on the blackboard.

Any sketching done by the teacher on the board may be required later from the children, so that they may learn to express themselves freely in maps. The sketching of these maps on the board or on paper, and the writing of the names of objects or places, may be profitable exercise in seat work during the study period.

In case the children need a topic for written language, it would be wise to use these topics developed in the excursion as a basis for such written work.

It is advisable to take a similar excursion with these children in June, when the fields show a wholly different aspect and the woods and groves are in leaf.

### View from the Bluffs at Winona, Minnesota

An excursion to the top of the bluffs that border the Mississippi River at Winona, Minnesota, may be used to illustrate the relation of the local topography

and commerce to similar topics in the later study of the United States and of foreign countries.

1. The author has made this trip with a class to the summit of the bluffs, six hundred feet above the river. The valley between the bluffs of Wisconsin and Minnesota at this point is about four miles wide, and the bluffs on both sides are forest-covered, except where a steep rocky cliff or limestone stratum stands out in plain view. The bottom lands are partly swampy and forest-covered, partly occupied by open fields and farms.

From the edge of the western bluff, at Winona, one can look up and down the river many miles, and see the receding line of cliffs, fading into blue, fifteen or twenty miles toward the north, and rising in mountainlike peaks toward the south. The great trough at one's feet is from four to seven miles wide, and six hundred feet below the level of the prairie and woodlands on either side of the river. The narrow course of the stream, like a silver ribbon, can be traced as it winds back and forth across the lowlands.

An occasional steamboat can be seen passing up or down the river, stopping at the levee at Winona to unload and take on goods. It passes under the high bridge that crosses to the Wisconsin side from Winona. More often still the railroad trains are seen at the foot of the bluffs, speeding their way up and down the valley on both sides of the river. It is quite evident, from the number of trains, that the railroads

carry by far the greater quantity of goods as compared with the steamboats.

The chimneys and stacks of the big sawmills and planing-mills, with their immense piles of lumber, are seen close by the river, and a rafting steamer may be observed at times, guiding a large log raft down the stream. The logs come from the pineries of Wisconsin.

The city of Winona is built on a long bed of sand, only about ten feet or less above the river at high water. The city extends five or six miles up and down the bank of the river, but only half or three-fourths of a mile in width. Wagon roads lead up and down the valley, and also climb through the little valleys to the prairie regions beyond the bluffs, bringing the produce of the farms. One railroad passes westward from Winona, through a winding valley, and after fifteen or twenty miles of steep grades, reaches the prairie lands six hundred feet above Winona.

On both sides of the river we can see, in the rocky slopes of the bluffs, a strip of limestone in which the quarries for securing building stone are found. One bluff, the Sugar Loaf, is almost effaced by quarries.

For several miles back from the face of the bluffs the country is hilly and broken, being deeply cut up by the lateral valleys and gulches reaching back from the river, and leading to the uplands. But in many places the level country at the top of the bluffs is covered with grain fields which are continued away westward for hundreds of miles.

The children may observe all the things we have mentioned, and many more, in the course of one or two excursions to these prominent points of view. The stratified rock appearing at like elevation on opposite sides of the river suggests that the stream in the course of ages has worn out this huge trough, and carried the waste seaward.

2. It will not be specially difficult, on the basis of such observations as those indicated above, to lead the children of Winona on an imaginary trip up the Mississippi to St. Paul and Minneapolis, and down to St. Louis and Cairo, and to give them a tolerably correct idea of the valley for a thousand miles of its upper navigable course. The river throughout this whole distance is lined with bluffs from two to six hundred feet high, and furnishes in summer time a steamboat trip with a great variety of imposing, beautiful views. The large rivers entering through broad, deep valleys from either side swell the current of the great stream till it is a mile in width. The prosperous cities along its course are sometimes in the valley close down by the river, in other cases rising upon the sloping hills and bluffs in commanding position.

The commerce of the river by steamboat, the rafting and lumber business, the trunk railroad lines up and down the valley for nearly the whole distance, can be interpreted and understood by the children from their observations at Winona.

## Steamboat Trip to Taughannock Falls

Embarking in a steam launch at Ithaca, New York, in an hour and a half we reach the landing which leads up the gorge to Taughannock Falls. Approaching the landing spot, we notice a decided projection of the land into the lake. It is really a broad belt of flat land extending into the lake, beyond the base of the hills which border the lake at nearly all points. As it lies directly in front of the outlet of the gorge we are led to guess that it has been formed by the stream issuing from the gorge. Following a path over this flat land we come to a road leading across a bridge which spans the creek. Looking up this creek perhaps two hundred yards, we see the lofty cliffs

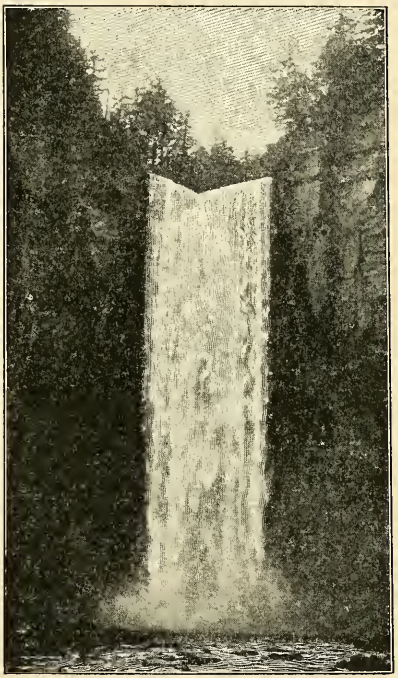

Fig. 4.

Taughannock Falls (215 feet high), on the western side of Cayuga Lake, a few miles north of Ithaca.

which guard the entrance to the gorge, and just below a ledge of limestone rock some fifteen or twenty feet thick over which the creek makes a cascading fall.

This belt or stratum of limestone we had before noticed from the boat, stretching along the shore line on the other side of the lake, where it is dug out from the top of the hill and used in connection with the underlying shales in making Portland cement.

The water of the creek in its action has loosened some of the upper layers of limestone and broken them into two or three shelves, and the great plates or fragments of the loosened stone give an irregularity to the falls. Just underneath the limestone at the foot of the falls the softer shales are washed out, leaving a suggestion of undermining the solid rock above. Directly above these falls the bed of the river is framed by solid limestone which has been more or less scoured by the water and its erosive materials. A little to one side of the main current a great number of shallow holes in the upper surface of the rocks mark the beginnings of pot-holes which are gradually ground out by pebbles being whirled around in the hole by the water. Pebbles are found lying in these holes.

At the left side of the falls above the limestone was a great cliff of what are known as Genesee shales, thin, paperlike layers of rock which crumble easily and can be pulled down in quantities with the hammer. These shales are dark in color and extend up

the side of the cliff a hundred feet. Surmounting these above are harder rock in strata. In passing up the gorge for a mile these shales are everywhere seen. Sometimes they show a sloping talus of loose broken shale which has crumbled from the sides of the cliffs. Occasionally, where a small stream, in rainy weather, has broken over the cliff, it has carried this loose shale down and formed a shale cone or talus cone at the bottom of the cliff. When the spring floods in the creek rise in the valley, it sweeps down the loose rock material and carries it toward the delta in the lake. This small broken shale is constantly tumbling down the slopes, more or less, as we noticed upon the excursion, and in the spring after the winter frosts and spring floods have loosened the rocks it is dangerous to walk beneath many of these steep cliffs by reason of dropping rock material. The fact that very little of this loose shale is seen as talus at the foot of the cliffs near the creek is proof that the stream in flood time rapidly carries it toward the lake. In this way the valley is widened somewhat rapidly, and the lake has been filled up to a depth of perhaps two or three hundred feet, and over an area covering many acres. It is not difficult to see that this gorge a mile long, nearly three hundred feet deep, and on the average perhaps five or six hundred feet wide, has sent a vast amount of rock stuff into the lake.

The walls of this gorge are in many cases perpendicular and from two hundred to two hundred and eighty feet high. In a few cases the upper rocks overhang

the valley in a threatening manner. Great buttresses and castellated rocks mark the upper third of the cliff and produce a powerful scenic effect. In other places the valley widens out and the sloping shelves of talus rock lie at the foot of great shale cliffs. The smooth face of the exposed rocks shows in other places that the rock has split off in large slabs along joint-planes, leaving what appears to be a solid mass of hard, smooth stone. Elsewhere the surface is very rough and jagged, and is made up of thin, loose, and easily broken sheets of shaly stone.

Along the rocky bed of the stream and at the rock-rimmed sides the layers of flat rock are split or fractured, showing great seams. These seams between the rocks are sometimes horizontal, sometimes vertical, and running in different directions they divide these stratified masses into blocks and cubes. Water getting into these joint-planes and freezing, splits them still farther apart or breaks them into smaller fragments. The roots of trees and bushes also grow into the cracks between the rocks on the edge of the stream or cliffs, and pry the rocks apart. The roaring torrents of the spring floods have great power to seize these loosened slabs and hurl them down the stream, at the same time breaking the rocks and scouring the channel. The evidences of this erosive power of the stream are seen in the flat, broken rocks scattered along the bed and piled up at intervals.

The general erosive power of the stream is plainly seen in its effects in the narrower channels, where the

water has plainly cut a channel in the solid rock, while the shelves of projecting strata on either side indicate the successive levels of the stream. Along most of its way the stream flows over a solid rocky bed. On the sides in a few places there is a succession of steps almost as regular as if chiselled out by man.

The water flowing in a small creek over a rocky bed does not ordinarily show much erosive power. The water is clear and mostly free from gravel or sand. But in times of rain and flood it is easy to see that great quantities of loose shale and gravel must be swept down the stream, scouring the bed.

At a few points the sides of the gorge were so close to the creek that it was difficult to climb along the ledge and not get into the water. Road building would therefore be difficult without blasting out the sides in these narrow places. There is, however, no well-marked path or road up this gorge.

At no point, however, is the gorge less than two hundred feet in width, and in many places the broken rocks and shale are piled up in long islands with the current of the creek running along both sides of them. This great quantity of rock débris and the loose talus at the foot of the cliffs are sufficient proof of the erosive power of the stream and the weathering along the valley sides.

The broader openings and flats of the gorge are covered with trees of considerable size and with bushes, and some of the slopes are partly covered with forest growth.

In making our way up the valley and past a grove of trees and bushes we come in sight suddenly of Taughannock Falls at the head of the gorge, two hundred and fifteen feet in height, and about thirty feet wide. It is a surpassingly beautiful sight, with just enough water in the stream to give it a steady pour, and to maintain the uniform appearance and shape for the entire plunge to the pool below.

It is girt round by a vast amphitheatre of rock, whose upper strata, nearly three hundred feet above the bottom of the glen, overhang the smooth vertical rocks below, which end in a sloping talus.

The creek has cut its way through the upper rock strata above to a depth of about sixty feet before making the plunge. At the bottom it drops into a deep pool from which it glides over the rim of rocks below. On the left side of the pool at the bottom of the steep rock are huge blocks of stone which have split off from the cliffs above and form the beginning of a talus slope close to the falls. A single block must weigh many tons. The spray from the falls is blown out along these rock surfaces of the cliff and over the pool to us a hundred feet away. Perhaps the constant wetting and freezing of these in the winter is one reason why they so rapidly weather and split off on both sides of the falls, causing the valley to widen out here into a broad amphitheatre.

In many places the walls of this mile of gorge are so steep that it is impossible to climb them. Just above the falls the amphitheatre of cliffs is too steep

to be ascended, though some daring efforts have been made. Some of the students of our party, at a sloping side of the gorge farther down, climbed to the top of the cliffs where a path had been made and steps partly worked out, but it was a difficult climb, giving, however, a commanding view into the deep chasm. As there is no outlet from the upper part of the gorge, no road has ever been built leading from it to the uplands beyond.

It is evident that the high cliff of nearly three hundred feet over which the creek leaps is a complete obstruction to road-making up this valley. Other creek valleys leading from the basin of Cayuga Lake into the uplands are natural roadways to the farm lands and villages beyond. Salmon Creek, for example, on the opposite side of the lake, two or three miles southward, has such a road following its valley past the village of Ludlowville.

It is evident, therefore, that the high precipice which gives such a beautiful fall at the head of the gorge is a complete hindrance in this case at least to road-building and commerce.

This fall might, however, be used as an excellent water power. The objections to this are: (1) that it would destroy one of the most beautiful pieces of scenery in New York State; and (2) the quantity of water passing over this fall is very irregular and unreliable, almost disappearing in the dry seasons. In spite of these things, however, it might be used to advantage as a water power. Some distance above this fall, in

the upper part of the valley, was built one of the first grist-mills in the early history of this part of New York. In similar gorges, near Ithaca, the water power has been long used for mills, and at one of the falls within the grounds of Cornell University a complete plant for illustrating a system of hydraulics, water wheels, etc., has been established.

On our return trip to the mouth of the gorge we were able to estimate more fully the vast amount of waste rock and gravel which has been washed down from the gorge into the lake. Observing again the width of perhaps six hundred feet on the average, a mile in length, and a depth of perhaps two hundred feet or more on the average, we get some proof of the power of weathering and stream action in carving out a valley. Coming out of the entrance of the gorge, we have a broad alluvial plain of perhaps forty acres, extending out into the lake, with a fine old apple orchard, rich meadows, and woods upon it. Originally the depth of the lake where the delta now lies may have been between two hundred and three hundred feet. It has been filled up and its surface converted into rich tillable land by the action of this creek in washing out rock waste into the lake. At the mouth of Salmon Creek, on the other side of the lake, a few miles farther south is a still larger delta formed in the lake in the same way. It is covered with corn-fields, orchards, and by a factory plant and other houses, while up the valley a short distance is a village with a highway into the uplands.

On a still larger scale at the head of Cayuga Lake is an extensive delta formed by the streams entering the lake from the south, — Six-mile Creek and Cayuga Inlet. This flat delta is two miles or more in length, and a mile wide at its lower end, and has been formed by these streams which have filled up the whole upper end of the lake. The city of Ithaca is built mainly upon the higher part of this delta, and the hill slopes beyond. There is talk now of deepening the northern outlet of the lake about three feet so as to lower the whole lake and drain out the low swampy part of the delta near Ithaca. This would have the double advantage of removing the danger of low swamp lands near the city, and also of bringing a large tract of excellent land under cultivation or into use for buildings, factories, etc. By an examination of the entire map of Cayuga Lake we may observe that wherever a stream of any consequence enters it a delta is formed, with such results as we have noted above.

The description of Taughannock Falls and gorge is found to repeat itself in certain parts of our country under varying conditions. For example, Deer Park, a small gorge opening into the Vermilion River, and that into the Illinois River, near La Salle, Illinois, is just such a gorge with a fall at its upper end. Cheyenne Cañon and Falls near Manitou, Colorado, in the neighborhood of Pike's Peak, is very similar to Taughannock Falls, only the cañon walls rise to a height of a thousand feet. Minnehaha Falls, within the limits

of Minneapolis and near the junction of the Mississippi River and the Minnesota River, drop into a cañon or gorge about eighty feet deep and repeat most of the phenomena of Taughannock Falls. Nearly all the small streams that come into the Upper Mississippi from the east or west, cut their way down through deep valleys which repeat many of the facts described above. Most of the rivers which are tributaries of the Ohio, Tennessee, Kentucky, etc., on the western slope of the Alleghanies, are similar to the streams flowing into Cayuga Lake. The same is true of the rivers which break through the foot-hills west of Denver and all along the eastern rim of the Rocky Mountains for a thousand miles. The river valleys of Virginia and the Carolinas, as their streams break through the mountains into the piedmont belt and to the tide-water region, repeat these same phenomena. The shores of the Great Lakes, where the streams come down from the uplands to the coast, as along Lakes Superior and Michigan, exhibit the same variety of cañons and falls. Niagara Falls and gorge, Minneapolis Falls and gorge, are almost identical in structure and explanation to those of Taughannock or Cayuga Lake.

Hundreds of other gorges and river valleys could be pointed out in the United States and North America.

## Sea Bathing on the East Coast of Florida

One of the pleasures of Northern people living in Florida during the late winter and spring months is a visit to the seacoast. Daytona, about fifty miles south of St. Augustine on the east coast, is one of those delightful towns which has become the winter home of many Northern people. For many miles the Halifax River, from a half to three-quarters of a mile wide, runs southward parallel to the coast, leaving a narrow strip of land two-thirds of a mile wide, separating the river from the ocean.

Along the inner or western bank of this river, among beautiful groves and thickets of live oak, pine, and palmetto, lies the town of Daytona, a paradise of beautiful homes, forested streets, and perfect roads for bicycles and carriages.

From the town three long bridges stretch across the Halifax River to the strip of wooded land whose eastern margin is washed by the tides of the ocean. This wooded peninsula is laid off by pleasant streets and adorned with many parklike grounds and luxurious winter homes built by Northern wealth. It really consists of a series of sand ridges or dunes, with low swales between, built up by the ocean tides and winds.

On its eastern edge is the last of these sand ridges, rising fifteen or twenty feet above high tide and wide enough for a row of cottages facing the ocean

and used by people who wish to spend a few days or weeks on the ocean shore and beach.

Landing at Daytona with a family of five boys and girls, the youngest three years old, we soon found a hack to carry us across the bridge to the seashore. The ocean as it came in sight was greeted with a shout, for inland children are strongly impressed at the first view of the wide-spreading waters, and by the noise of the breakers pounding on the sandy beach. Before the grown folks could get to their feet, the children were down at the water's edge, gathering shells and running up and down the smooth sands.

A five-room cottage, simply furnished for housekeeping, was soon arranged for at the grocery store near the beach, where we also secured our provisions. Our trunks were brought over from the station, and we were soon settled for a two or three weeks' stay within the sound of the breakers.

It was during the last half of April, and the weather was warm and sunny, like warm days in June in Northern climates, and the children were eager to get their bathing-suits on and learn to tumble about in the waves which rolled in gently along the shallow beach. The children were soon ready for a plunge, and the older folks likewise. Then chasing down the ridge and across the sands, they splashed into the waters which, at first, seemed a little chill, but after a plunge or two proved quite comfortable. The little girls capered about in the shallow waters up to their knees, then rolled and tumbled as if they had

suddenly taken to the notion that salt water was their natural element.

Some of the older folks waded out two hundred feet or more to where the inrolling waves broke in white caps upon the shallow sands, and standing would brace themselves to receive the splash of the great waves which would often roll over their heads. Just beyond these breakers was good swimming-ground for men, but often the undertow makes it

FIG. 5.
On the beach at bathing time.

dangerous for many people to go out so far. Standing in water two feet deep one can feel the strong undertow sweeping seaward and undermining the sands upon which one is standing.

After a quarter of an hour or more of lively sport with the inpouring waves, we would run up the beach and climb the ridge to our cottage, and by the time we had rubbed down and dressed again lunch time was greeted with a hearty appetite.

All along the beach as the tide comes in the bathers

from the cottages and hotels may be seen taking the refreshment of these sea baths. Sometimes the bathers get out on the dry, sandy beach and run up and down for exercise, or go through with gymnastic drills for development of limbs and chest. Every day almost the bathing time presents a lively scene, and the children are always ready for its return.

But there are also plenty of other sports for those who seek the seashore. When the tide is out the long strip of hard sand is as smooth and hard as a floor, so that carriage wheels and even horses' hoofs hardly dent it. Then the bicyclers, of whom there are many, go spinning along for miles over an almost perfect road. Carriages and automobiles also find this the best of driveways, and the bracing sea air and the broad ocean view, with the long line of white breakers, furnish a scenery and music which with many people do not grow tiresome.

The children wandered up and down the beach, observing and collecting the curious shells, clams, and crabs which are washed up from the sea. Or they take their shovels and pans and scoop the sands, dig trenches and watch the waves come in to destroy their work. Early in the morning the older boys would often go out upon the beach to gather the finer specimens of shells washed shoreward during the night, before they were captured by the regular shell hunters.

Two long piers at two hotels about a mile apart reach out several hundred feet into the water. They consist of tree trunks, or piles driven down into the

sands in two rows and some fifteen feet apart, upon which is built a floor and passageway to walk out to the fishing stand and shed at the end of the pier. At some seasons many fish are caught from the piers, such as sea-bass, whitings, and occasionally a shark.

But in April most of the fishing was done from the long bridges which cross the Halifax River. From sun-up all through the day the fishermen move up and down these bridges fishing and casting for the crevalle, bass, trout, crabs, etc. The boys enjoyed an occasional trip to the bridge, and several times brought home a good string of fish which we cleaned and cooked and enjoyed all the more from the fact that they were caught by the boys themselves.

The small coquina clam (whose shell is less than an inch long) is washed up by the tide in great numbers, and oftentimes the boys would shovel them into a box with a sieve bottom, and wash them free from sand in the sea water. A pailful of these clams when washed and boiled make a delicious soup which we often relished.

Another interesting sight which we witnessed from the cottage or from the beach while bathing was the movement of a school of porpoises just outside the breakers. They would shoot along sometimes under water, then springing out of it or showing their black sides above the surface. Occasionally one of these porpoises would move up the river from the sea, scaring the fish before it, puffing now and then as it rose

above the water, and then disappearing to rise again several rods farther on in its course.

Besides the cottages there are several large hotels and boarding-houses where people are entertained for a few days or weeks. The drives along the coast and among the groves and parks back from the sea give a great variety of scenery.

From our cottage we could see at night the glare of the light from the lighthouse on the coast twelve miles below us, and two or three times we saw the lights of a vessel moving southward out at sea, or in the daytime the smoke of a passing steamer could be seen though the vessel itself was out of sight.

Once the children on bicycles took a trip six miles up the beach to Ormond and saw in the water's edge the rotting timbers of a ship that had been wrecked upon this coast.

In the winter time many Northern people spend a few months at Daytona in their homes or in hotels, and even during the winter months there is usually some bathing along the beach. In the summer months, when the interior of Florida is hot and sultry, many people come to the seashore to enjoy the cooler breezes. In the summer time, therefore, the cottages are full of Southern people and their children, and many excursions are made from the interior towns to the coast. In this way Daytona has a double season, one for the Northern tourists in winter time and one for the Southern people in summer.

At many points along the east and west coast are these resorts, which become more popular from year to year. The same may be said of the whole Atlantic coast from Maine to Florida. On the coast of the Carolinas, Virginia, New Jersey, Massachusetts, and Maine are found these popular seaside resorts, where thousands and thousands of people find the refreshing sea bath and the cool breezes which are so much needed in the warm months of summer.

FIG. 6.
A view of Denver.

## DENVER, COLORADO

The city of Denver has grown into importance more rapidly than any other city along the eastern rim of the Rocky Mountains. We may inquire into the reasons which have made it such a beautiful and important centre of population.

The city is located on the south fork of the Platte River, a little north of the centre of Colorado. It lies in a plain sloping to the banks of the river, about ten miles from the foot-hills of the Rocky Mountains. Stretching from north to south, the main ridge of the

mountains, at the nearest point about forty miles away, can be seen for one hundred and fifty miles. On account of the clear skies, these mountains can be distinctly seen at nearly all times from Denver. This transparent clearness of the air is partly due to the fact that Denver lies a mile above sea level, and partly to the fact that the weather is seldom cloudy. Even the summer rains and storms are of short duration, and it is only at long intervals that the weather is cloudy and rainy for several days in succession. The mountains are far enough away to take on a beautiful haze and a crimson tint, which usually gives their ridges a dreamy, smooth outline that leaves a distinct impression of fairy-land. This grand, expansive view of the mountains is a perennial pleasure, and to one who has left this region for the plain land of the Mississippi Valley states leaves a distinct feeling of loss.

Pike's Peak, sixty miles away to the south, is a great landmark, always in view, and most of the year shows a round top covered with snow. Some fifty miles away to the northwest, is Long's Peak, equally a notable landmark upon the horizon of the mountains. Between these runs the irregular chain of ridges and lesser peaks. Each of these two mountains looks down upon one of the mountain parks or broader upland valleys for which Colorado is famous. Coming down from the main chain are many small rivers and mountain streams which have cut out deep cañon ways and broken through the foot-hills upon the plain to join the Platte River. The roads leading

up through these river gorges guide to many of the summer camping places of Denver families, in the midst of the wild scenery of the mountains. Eastward from Denver stretch away the monotonous plains toward Kansas and Nebraska.

In 1859, when gold was discovered in the foot-hills and river sands within sight of Pike's Peak, there was a large immigration to Colorado of people seeking their fortunes. It was much like the migration to California ten years earlier.

It was about this time that Denver had its beginnings and sprang into active business life as a centre for those interested in mining. In the early days the sands at the mouths of the creeks emerging from the mountain cañons were washed for gold in what was called placer mining. There are no mines in the immediate neighborhood of Denver, but along the cañons of Clear Creek, reaching up forty miles to Georgetown, there are many gold and silver mines. At Black Hawk, Silver Cliff, Leadville, and later at Cripple Creek, rich mines were located. The small mountain towns, perched among the narrow valleys, could never grow into cities; but Denver, as a general distributing centre for goods to all these remote places in the mountains, had plenty of room and a pleasing site for people who had acquired wealth in mining or who had capital for carrying on mercantile business.

In 1876, when Colorado was admitted as a state, Denver had grown to such importance and was so centrally located, that it easily became the capital of

the state. Since then it has had a remarkable growth, and because of its large and costly buildings, and of all sorts of city improvements, parks, streets, etc., has become one of the most attractive, progressive cities of our land.

In its early days Denver was almost destitute of trees. Close to the river a few cottonwoods might be found, but the dry, sandy plain, sloping toward the river, must have been at first almost a desert. But an irrigation ditch taken from the Platte River, ten miles up-stream to the south, was conducted to the upper part of the slope, a mile or more east of the river, and from this twelve-foot ditch small streams were drawn off to trickle along the roots of young trees planted for shade and ornament along the streets. The cottonwoods were planted almost exclusively at first, then maples, box elders, and others. By 1880 many of the residence streets were well shaded, and there were many beautiful lawns, gardens, and residences.

A system of city waterworks was early established, the water being collected in a lake or reservoir above the city, near the Platte. This water was good both for household purposes and for lawns, and for the fire department. Many gardens and fields were also irrigated from the above-mentioned city ditch.

About 1880 the big ditch taken from the river some twenty-five miles above Denver brought under cultivation a wide strip of country on the east bank of the Platte; and upon the slopes below the ditch farms

and gardens were laid out, which could supply the city with a great amount of garden truck, fruits, dairy products, melons, farm supplies, etc.

The strip of land, about ten miles wide, between Denver and the foot-hills, is supplied with water for irrigation from artificial lakes, formed by dams in the small streams coming down from the mountains. This whole region is now a rich and fruitful garden land, supplying strawberries, cabbages, and other garden truck to the city.

In the development of mining industries, Denver has become the centre of much wealth. Rich mine owners have found it the best place for their families. Many costly and beautiful mansions have been built, and the public buildings, especially the court-house and the state-house on Capitol Hill, are notable structures. The opera house and the great business blocks and streets present an array of splendid buildings which could hardly be expected in a young city.

Northwest of the city are located the great smelters, where the gold and silver ore collected from the stamp-mills in many of the mountain towns is smelted. Here the ore is melted and separated into the pure metals and slag. The great smelting furnaces run day and night and Sundays, and turn out the refined metal in the form of bricks.

One of the remarkable facts in regard to Denver is the development of her public school system. Money has been spent lavishly upon fully equipped modern school buildings. In spite of its exceedingly rapid

growth, the erection of fine school buildings, architecturally beautiful, and superior in interior arrangement and solid construction, has kept up with the growing demands. The great high school building was liberally conceived, and built in successive parts as the demands grew. There is, perhaps, scarcely a city in the country where more experienced and better-paid teachers have been regularly employed. This acknowledged excellence of the schools has been one reason why many people of a superior class have chosen to settle in Denver, and its fine school system has been one of the main causes of its rapid development in population.

The University of Denver is beautifully located at a suburb, four or five miles south of the city, where extensive buildings and beautiful grounds have been laid out, and where the same grand view of the mountains is always spread out in full display. An electric line connects this and other suburbs with the city. Under these conditions, a boy or girl can secure in Denver a complete education from the kindergarten through the university.

In its early years Denver had no railroad connecting it with the East. It was reached by wagon or stage over the plains from Kansas City or Omaha. But when the Union Pacific was built, a branch of it ran down to Denver. Later the Santa Fé at Pueblo was connected with Denver by the Rio Grande Railroad, which followed the Arkansas to Leadville. Later other Eastern roads, as the Northwestern and

the Burlington, came direct to Denver. A trunk line connects Denver with Galveston on the Gulf, and several lines extend westward across the mountains. Denver has thus become the railroad centre of the West, and a splendid union depot was built some years ago, where all trains come in and go out. The street-car system of the city also radiates from this same centre, leading to all parts. Besides serving as a centre for the shipment of ores, Denver is the chief point for wholesale trade, and for outfitters going into the mines.

For many years tourists going into the Rocky Mountains have made Denver their starting-point, either for Manitou and the region of Pike's Peak, or to Estes Park near Long's Peak. The number of tourists in summer time has greatly increased in recent years on account of the very cheap rates offered by railroads from Chicago and other cities.

A number of important cities are located, like Denver, at the eastern edge of the mountain uplift. Pueblo, one hundred and twenty miles south of Denver, is even more favorably located than Denver for the smelting of ores. It lies on the Arkansas River, at its outlet from the rich mining towns of southern Colorado, which, like Leadville, send their output through the Royal Gorge, where the river cuts its mile-deep cañon through the mighty ridge of the Rockies. Between Pueblo and Denver lies the considerable city of Colorado Springs, at the foot of Pike's Peak, and near Manitou, the great summer resort of Colorado. This

region is especially helpful to many people suffering with lung troubles.

Helena, in Montana, lying in the mountains of the North, is the Denver of that region, while the ancient city of Santa Fé, with its largely Mexican population, is the natural centre of trade and population in New Mexico. Many smaller cities, as Cheyenne, Greeley, Trinidad, and Leadville, are scattered along the eastern rim of the mountains, and such has been the growth of agriculture through irrigation and through the development of mining on a large scale, that the population of the Rocky Mountain States has increased to large proportions. Denver has about two hundred thousand people, more than the whole state had when it was admitted as a state.

The city of Indianapolis, like Denver, is a great railroad centre, and like Denver, lies almost in the middle of a state without important river or water advantages. They are the only large cities in America that do not lie on or near navigable water. Minneapolis and Kansas City are each about the size of Denver, but lie close to great navigable rivers.

### View from Wheeling Hill

The city of Wheeling, West Virginia, lies in the valley of the Ohio River, closely walled in on all sides by high hills. The north part of the town stretches along a narrow slope, two or three blocks wide, between the sloping side of Wheeling Hill and

the Ohio River. Farther south the broad bottom or terrace at the outlet of Wheeling Creek widens out to a somewhat extended flat between the river and sides of Champlain Hill, at the base of which flows the creek.

At the north end of Wheeling a wagon road rises along the side of Wheeling Hill, till it reaches the

FIG. 7.
The Ohio River.

point where it turns back along the top of the ridge, and leads up gradually to a point, about three hundred feet above the river.

From the narrow summit of this ridge, a broad view of the Ohio Valley in this neighborhood is given. Two hundred feet below us are the tops of the high buildings of the city of Wheeling, crowded together in the narrow space between the river and the hill. The yards in the residence district are small, and the

dwelling-houses are built close to the street and near together.

The tall steeples of the churches look small from our high point of view. Where the city spreads out to fill the valley, at the mouth of Wheeling Creek, we see a great mass of business blocks and factories. Toward the south the great iron mills and breweries show the smoky manufacturing part of the city. While we are looking one of the great blast-furnaces blazes up with a broad red flame, as its cap is removed for the charge of fuel or ore. At times the smoke from the many tall chimneys is spread out through the valley, obscuring the view in that direction.

Five or six miles down the river, on the Ohio side, are plainly seen the big chimneys and blast-furnaces of Bellaire, adding their contribution of smoke and soot to the gloom of the valley. Across the river on the Ohio shore, is a whole series of towns in plain view. Bellaire with fifteen thousand people at the south, West Wheeling, Bridgeport, and Martin's Ferry, with two or three smaller villages, stretch along the narrow bench between the river and the high-sloping hills. Where a valley stretches back westward between the bluffs, the village of Bridgeport fills with houses the lower levels and slopes.

Down in its deep trough the yellow waters of the Ohio flow in a broad current, which can be seen in its winding course some eight or ten miles. A long wooded island stretches parallel to the city, to which the two great bridges are seen to lead. This island

was originally covered with forests, and has been laid out into beautiful streets with fine residences fronting on the river. Seven thousand people have their homes upon this island. The yards and streets lie about sixty feet above low water. But in February and March of each year, the river steadily rises with the melting snows and rains till it fills the cellars and covers the yards, and occasionally rises into the lower stories of the houses. People are then compelled to move about in boats.

At the north end of this island is the state fair ground, with its booths and race-course. While we are looking the horses are seen stretching themselves in the race, and thousands of people are watching the runners in the state fair races.

At the north end of the ridge upon which we are standing is the city reservoir, into which the water is pumped for the city's supply from the Ohio River two miles above.

To our surprise, as we look down on the west side of this ridge, away from Wheeling eastward, we see a broad, deep valley, which is formed by a great bend in Wheeling Creek. If this narrow ridge on which we stand were cut away, it would allow the city to spread out over a much broader level area. As we look up the winding valley of Wheeling Creek, we see that all its level parts and lower slopes are covered with villages, suburbs of Wheeling. Two electric lines besides a railroad are pointed out, which wind their way along the sides of this valley. In this

direction and five or six miles away are several delightful suburbs, with lawns, gardens, and large yards, away from the soot and smoke of the city.

From our high lookout it becomes very clear that all the little valleys and even sloping hillsides of this whole region, on both sides of the river, and the island, are needed for houses and towns. The tops of the hills are usually not built upon, partly because they are so high to reach, and partly because they are mere ridges, with little or no level land for yards, farms, gardens, etc.

The railroads are also seen to have a hard time making their way through such a rough country. Several bridges are in sight, where the railroads cross Wheeling Creek in the valley just back of the ridge, and the dark mouths of two long tunnels are seen where the railroads pass through the high, broad ridges, in order to continue their course along the Ohio or up the valley of Wheeling Creek.

At the south end of the peninsula or ridge upon which we stand, we look down upon the broader flat which lies at the mouth of Wheeling Creek, and where the larger part of Wheeling is built. It looks as if this flat land were a delta, formed by the creek at its junction with the Ohio, spreading out the silt and gravel it had brought down from the valley above. As the main channel of the Ohio was scoured deeper, the creek also cut down through its own delta to get to the level of the river.

At the other or north part of this ridge, where it

connects with the hills back from the river, it is crossed by the old national road, built in Henry Clay's time. This road was well constructed at national expense, and its solid road-bed, heavy stone bridges, and well-built terrace along the steep hillsides, still show the excellence of this old road making. Just below this ridge the national road crossed the river by a ferry to Ohio, and followed the valley of the creek westward through Columbus, Ohio, to St. Louis, Missouri. Near the point where this road crosses the ridge, according to the story, McCullough, the famous Indian fighter, when pursued by the savages, leaped his horse down the steep slope to the creek below and escaped.

Looking down on the other side, toward the Ohio River, we see near at hand the hotel which marks the spot where old Fort Henry stood. This is now a crowded part of the city, close to the chief market-place, and a stone tablet set up at the edge of the sidewalk locates the corner of the fort at a high point where the street slopes off in three directions. Here was done the last fighting of the Revolutionary War. The British attacked this fort after the treaty had been made, but before the news had reached the Ohio Valley.

It was at this place that George Rogers Clark stopped to gain recruits for his little army as he descended the Ohio, before making his successful expedition against Kaskaskia and Vincennes. There are a number of famous incidents connected with

Fort Henry in early Indian warfare. Among others is that of Elizabeth Zane.

The two bridges which are seen spanning the river below us are high bridges, so that steamboats can pass under them. But in high water boats are compelled sometimes to lower their stacks. A steamboat is seen making its way down the river, although the water at this season is low. But in the spring and early summer time the coal barges are sent down the river in great numbers, and thousands of passengers journey up and down in the regular trips of the steamers.

The bluffs east of Wheeling are barren and ugly, while those on the Ohio side are partly covered with groves and fields, and are much more pleasing. Sloping up from the river bank, the higher hills rise about eight hundred feet above the river, or fourteen hundred feet above the sea level. A trip in a steamboat down this part of the Ohio has many fine views of wooded hills and slopes, and of green and fruitful valleys, through which creeks come down to meet the Ohio.

Wheeling, as seen from one of these hills, is a manufacturing city, the whole valley being clouded, oftentimes, with the dense smoke from chimneys, all along the river on both sides. There are very large iron works and machine shops at Wheeling and at Bellaire, also glass factories, potteries, breweries, foundries, paper-mills, planing-mills, wagon factories, and other manufacturing plants.

Wheeling has a population of more than forty thousand, but the villages and suburbs with which it is connected by trolley lines greatly increase its importance as a market and trade centre. It is the largest city of West Virginia, and is well supplied with schools and churches.

For the children of Wheeling the study of this city, as thus outlined, is a profitable preparation for the chief features of the Ohio River in its entire course from Pittsburg to Cairo, and by comparison later leads to a comprehension of the Upper Mississippi, the Hudson, and other rivers. The iron industries and factories at and near Wheeling easily suggest the greater iron industries at Pittsburg and all along the Upper Ohio. In later studies the children will learn that at Chattanooga, Birmingham, and other places along the western slopes of the Alleghany highlands are found the extensive iron industries which are so much like those at Wheeling. At Chicago, Cleveland, and Buffalo, also, are large blast furnaces and rolling mills.

The hills and valleys, the river and creeks, about Wheeling, are a fine illustration of the deeply dissected region of the whole western Alleghany plateau, from northern Mississippi to western New York.

## An Excursion to Coney Island

From an Excursion worked up by J. B. Opdyke

A trip to the seashore by trolley late in April has a special geographical value for the children. The summer conditions of the beach and water, so artificial in a way and so well known to most children, are very different from those that prevail in early spring. At this time the sea environment at Coney Island is in its crude, natural form. The advantages offered for the study of geography are too numerous and too valuable to be exhausted by one excursion, though a good general view of the whole can be had.

Upon reaching Coney Island, the beach and the water naturally first attract the attention. It seems deserted. There is a broad stretch of solitary sand and water. The slope of the beach is seen to vary, in some places being very gradual, in others quite steep. This is accounted for by the different kinds of soil against which the water wears and by the varying roughness of the sea. In two places there is almost a perpendicular line to the water's edge, owing to the fact that the shore is here composed of rock. The dangers of a steep shore are pointed out, as are also the advantages of a sloping one. The irregular beach line is noticed and is explained to be due to the unyielding condition of the shore in places where a rock bottom renders washing more difficult.

The sand is studied as to fineness, color, and use. The children are easily able to explain, after they have

watched the grinding tendency of the restless water on the shore, why the sand is so fine. Its color becomes darker as one walks from the water's edge inland, and presently grass can be seen sprouting up through it.

Shells of various kinds and shapes are examined and as far as possible are explained. Some bits of animal life are found clinging to many of them. There is much seaweed washed up on the beach. This is examined carefully and compared with grass. The beach is covered with various peculiar things that have been washed up during the storm of winter. Some forms of life, such as sand-crabs, an occasional dead fish, etc., serve as an additional impetus to the interest. Refuse of all kinds from the depths is attractively instructive as it is investigated. The varying marks of the sea's winter terror are still clearly seen, much damage being still in evidence. The receding of the sea line in some places is discussed, together with its outward tendency in others.

The water itself is seen to have a characteristic of foaminess. This is attributed to its action and its salt content. The waves vary in size, and the reasons for this are discussed. The whitecap attracts attention, and its cause is seen in the wind. The action of the waves, their rate of progress, their cause, and their kinds of movement are noticed. The gradual advance made by each wave over every other as it washes up on the shore gives rise to the subject of the tides.

On looking out as far as can be seen a general color will be perceived. The color of the water is compared with that in the rivers about New York and also with the drinking water.

The whole appearance is one of great roughness, due partly to the season of the year and also to the natural conditions off Sandy Hook. This is explained by the pupils. The uniting of the bay with the ocean at this point, and the peculiarly shaped peninsula of Sandy Hook are the leading agents. Vessels can be seen plying over this rough passageway, which is the door opening on their way to Europe or to places along the coast. They appear to be standing still, but on watching closely we can see that they pass out of sight. The horizon is then noted with particular interest, seeming to extend down into the water. The distance of the vessels from the beach is approximated by means of ascertaining from pocket maps the distance of Sandy Hook from Coney Island. Surprising results are got at in this way. The Hook has the appearance of being quite near, but the distance, when actually known, is unbelievable to the children. What is the reason for this deception? Is the same thing true on land? What is the shape of Sandy Hook? Illustrate it by a little sketch on the damp sand. Compare that sketch with your pocket map. Explain the cause of its formation.

The outline of the beach from the extreme right to the extreme left is very irregular. By going part way out on the pier this can be seen to good advantage.

On the extreme left, far in the distance, the villages of Canarsie and Bergen Beach can be seen. They seem to stand out in the sea, but the shore outline curves around from these places almost semicircularly until it is nearly in a line with the Coney Island shore. Manhattan Beach stands out clearly, with its two great hotels. It seems to stand out farther than the general shore line. Then the line again seems to recede until Brighton is reached, which place seems also to extend out into the ocean. The same shore characteristic is noticeable between Brighton and Coney Island, from which the children deduct that the resorts are built out over the water.

Draw in the sand the general outline of the beach as far as it has been observed, and insert these places. Compare the outlines with the pocket maps. Then compare this outline with the outline of Sandy Hook across the way.

Why is this place called an island? Make an outline of the island. How is it separated from Long Island proper? Approximate the dimensions of the island.

On inspecting the town itself, it is seen to be in a somewhat ravaged condition. The winter storms have washed the board walk away in some places. Many of the smaller buildings have been inundated by the water and have had their foundations washed out and are twisted from their positions. Its plan is fairly regular. Its population is found to be about two thousand at this season of the year. It fluctuates in the

summer to the number of many thousands. Judging from the character of the buildings the people seem to be given over entirely to the catch-penny business. There are shops of all kinds, theatres galore, and various novelties. None of these are in operation at this season of the year, of course, but they are undergoing extensive repairs preparatory for the coming season. Many new buildings are being erected, all of which are built without cellars because of the impossibility of keeping the water out. Other buildings under erection are amusement houses, such as switchbacks, bathing houses, and so on. There are no large hotels because it is a daily resort. People come to the island on day excursions. Very few come to this part to spend a longer time. The three main resorts on the island are Manhattan, Brighton, and Coney Island. Manhattan has two colossal hotels, Brighton one, for the accommodation of guests for the season; and many differences are noted between these resorts and Coney Island or East Brighton proper.

The main streets are noticed to be parallel with the seashore. There is a gradual curve in the shore along this part of the island, and the streets are also curved. The pier is undergoing repairs, the piles, many of them, having been washed out of place. The whole atmosphere is astir with extensive preparations for the summer season. The predominance of saloons is inevitably noticeable.

The terminals of a great number of car lines are

noticed. Why are there so many of them? Why is this the largest place on the island? What is the chief attraction of the place?

As the car leaves the island to return to the city a bird's-eye view of the whole island can be had to better advantage perhaps than from any other place. Peninsulas and inlets are noted and discussed, as are also the lowlands just outside of the resort proper. The tall sea-grass furnishes a topic for consideration. Its differences from other grass are taken account of. The railroads are seen to be embanked higher than the level, showing the instability of the sea-sand soil for good foundation. In the rear of all the resorts the thoroughfares are netted with trolley wires, telegraph wires, etc. The little inlet or creek which separates Coney Island from the mainland is crossed. It is deep and furnishes good fishing. Advertising boards along the trolley line attract attention, and some little idea of the great business of advertising is to be had. The waning of the fresh salt air is soon noticed after the passing of the inlet, and the ordinary, mixed city-and-sea air is inhaled again.

Such an excursion does not begin or end, of course, with just the point in view. From the time the children are seated in the car until they leave it, there are constantly occurring topics of geographical interest and discussion. The farms, the fields, the suburban houses, the different localities of the city, the parks, the public buildings passed, etc., are all subjects which they will bring up, inquire about, and

discuss. The teacher needs to be an inexhaustible questioner from the beginning of the excursion to the end. It is very seldom that he himself will have to do any answering. What one of the bright city children does not know, another does and is able to explain. The teacher's business is to guide the questions, to contribute the general points of information, and most of all to suggest.

### The Creek and Pond

A local creek may furnish occasion for more than one good excursion. The Kishwaukee at De Kalb is an example.

The winding course of the creek, fringed in places with groves of natural woods, the general direction of the valley, with the slopes on the sides, and the tributary brooks, can be traced by observation. The floods of the Kishwaukee in March, which are caused by the melting snow and rain, break up the ice which has formed during the winter months and send it down the stream in floating masses. This mass of ice sometimes collects above the foot-bridge, and even threatens to sweep away the heavy piles upon which it is built. The water is from five to eight feet deep and from sixty to one hundred feet wide. During the several days of the spring freshet, and for several weeks, in fact, a very large quantity of water passes down this valley. Without the river to drain off this excess of water the fields would remain flooded for long periods.

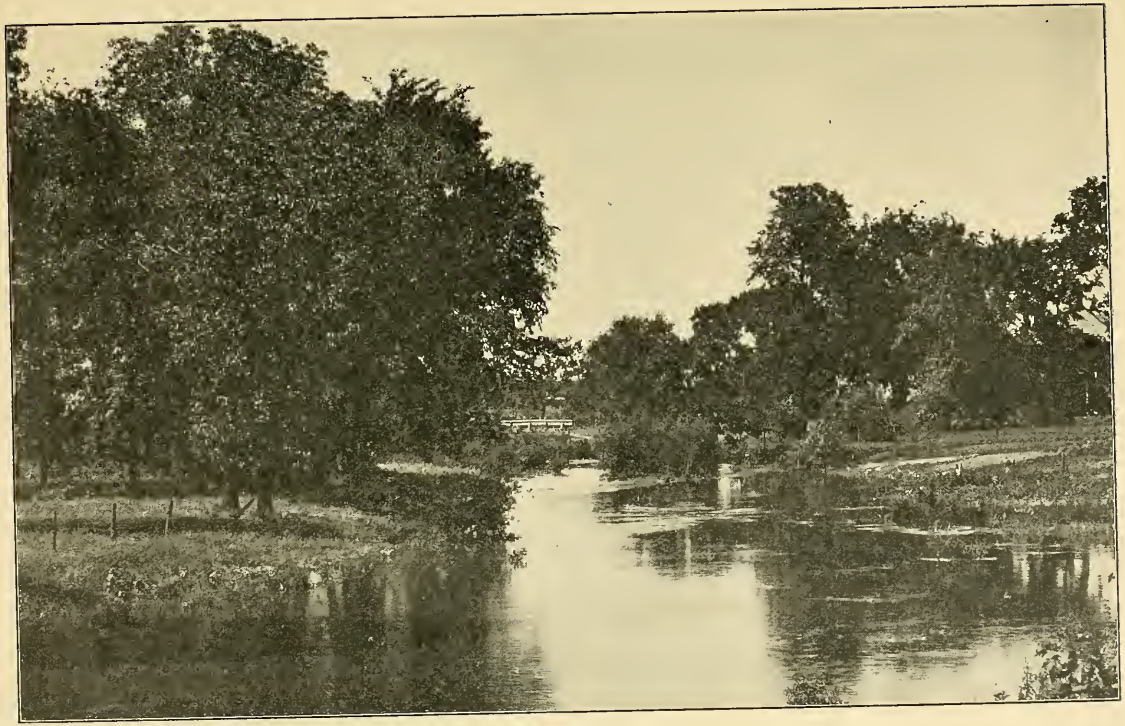

FIG. 8.

View of the creek from the campus.

At the same time the small tributary stream or brook which passes through the campus grounds overflows its banks, and spreads out over the low part of the campus almost like a river, making approach from that direction to the school impossible. It collects much sediment from the corn-fields and other fields which it drains, and when the flood is passed the mud is found covering the sidewalks and slopes. On the other side of the creek, toward the town, small runs and sewers empty into the creek, which in this way provides drainage for the town.

During the dry summer and autumn months there is in some years but little running water. Locate the sources of the creek in the swampy prairies some miles south of De Kalb. Here the channel has been deepened and straightened by artificial ditching, thus draining the rich prairie swamps and converting them into rich, productive fields.

Trace the course of this small river northward until it unites with other creeks, passes by the city of Belvidere, and joins the Rock River. On the map of Illinois follow the course of the Rock River until it joins the Mississippi, then on the map of the United States trace the Mississippi until it reaches the Gulf of Mexico.

On the low ground close by the creek is a pond.

Observe the pond on the campus and the slopes from which the water is collected. At other places upon the prairie, low, swampy ponds have been seen by the children. Call to mind the rank grasses and

cattails which are found growing in these ponds. Where they have been drained out, the effects upon the rich soil can be seen. At several points along the Kishwaukee are partial dams, causing the water to collect above. At points where small creeks enter can be seen the fan of dirt which has been washed down by the tributary brook. Notice the effect of washing and rolling upon the pebbles and stones in the bed of the creek.

## The Valley and Rock Strata at Faribault, Minnesota

A trip across the bridge at Faribault to the sandstone ledges on the east side of the valley is always interesting.

The valley is a quarter of a mile wide, with broad bottoms covered partly with trees, but flooded with spring freshets. The river winds its course through this valley and shows gravel and sand banks and the river wash to good advantage. On the farther side are seen the yellow sand cliffs and ledges, rising twenty and thirty feet in height. The rock crumbles readily, and it is easy to scrape holes into it. In this way little caves have been dug into the side of the hills, and the loose fragments and sand collect at the bottom of the ledge. The little children like to collect this pretty yellow sand and carry it home in pails to use in playhouses.

The hill slopes upward from the lower ledges and

is covered with forest growth. On the ledges the trees send their roots into the cracks and crevices and seem to find nourishment even in these barren places.

Just north of the blind asylum is a gorge some eighty feet in depth, which has been cut down by a brook which enters the main valley at this point. On the upper sides are the yellow sand ledges, which it is somewhat difficult to reach by climbing. Into the side of this sandstone stratum has been dug a passage, opening into a large cave shaped like a cistern, in which half a dozen persons may find refuge from a storm.

In the bottom of the narrow valley the little brook has cut a channel into the harder rock six or eight feet deep and from seven to ten feet wide. The action of the water in scouring out this little cañon can be easily traced, although it is dry in summer time. The melting snows of spring and the rain floods send a torrent down this valley, which carries much sand, dirt, and gravel to the point where it joins the small river below. The outlet of this valley is blocked by a solid earth causeway about thirty feet high, over which a road passes to the level plain above. The brook escapes through a long stone archway which forms a tunnel under this embankment. It is a good illustration of the labor and expense of road building and tunnelling in a hilly country.

The valley sides show considerable variety of loam, clay, sandstone rocks, gravel pits, and hard shales.

The vegetation of wild flowers, bushes, trees, and vines corresponds to the conditions of soil at various points.

The place where the brook meets the river exhibits a collection of large gravel and big stones which show the power of this little stream.

Farther up the little valley is a thicket of trees and bushes.

The visit to this little valley in spring or fall is easily made from the schools of the town.

### VISIT TO A CITY PARK

1. Trees and grounds, shrubbery.
2. Lakes and streams.
3. Wild animals; zoölogical garden.
4. Lawns and playgrounds.
5. Irregular surface, rocks, streams, etc.
6. Value of parks.
7. Monuments and statues.
8. The city parks and their management.
9. Expense to the city; taxes; park officers.

## CHAPTER II

### EXCURSIONS TO SHOPS AND FACTORIES

#### Excursions to observe House Building

In the spring or fall, near the school, some house just building may be found. The whole process, from the digging of the cellar and laying of cellar walls to the final painting of the house and seeding of the lawn, can be easily observed.

We have often taken a class of children for an hour's excursion to such a place. The children are naturally interested in seeing the building materials, the tools, and workmen. As the dirt is thrown out for the cellar and ditch for drainage and sewer connections, we may notice the different layers of soil, clay, sand, and sometimes stone. The digging of the cistern shows this still better.

The brick, stone, and mortar of the basement walls and the tools and skill of the masons are inspected.

When the foundation is complete or while the masons are at work upon it, notice the form and dimensions of the basement, the partition walls, the thickness and strength of walls, and the cellar windows and door-frames. On the return from the first excursion have a description of the materials and

work seen and the tools used. Draw also the ground plan of the basement, using the foot or yard as a standard of measurement. The sources from which the materials are brought, as the brick-yard, the lime-pit, the sand-bank, and the carpenter shop, are worthy of special mention, showing, even in the case of the basement, from how many different places the materials are gathered.

A second trip may be made when the wooden framework of the building is toward completion, or if it is a brick or stone building, when it is being roofed. The posts, joists, beams, studding, and rafters may be seen, and how they are mortised or nailed together and rested upon the foundation. (If the teacher does not know the names of these timbers, ask the contractor or workmen. It is not necessary to disturb the workmen, and they are quite willing to answer questions.) Notice the joists of the second story and how they are supported, also the rafters for the roof, and how they are fastened to the ridge and walls. The manner of setting in various doors and frames may be seen.

At this time one may also best observe the location of brick chimneys and ventilation pipes, the pipes also for plumbing or for gas, and the wiring for electric lights or door-bells. The possible dangers from bad flues, poor plumbing, or electric wires may be mentioned and the means for preventing these clearly seen. This brings us close to the special difficulties and particular skill required from different

classes of workmen. It is interesting also to notice the dependence of the different workmen upon each other, for example, the masons, carpenters, and plumbers. The division of labor is very noticeable.

A third trip may be made to observe the lathing, plastering, and flooring. The slaking of lime and mixing with hair in preparing the plaster are instructive. The roofing, tinning, and exterior painting bring in still other classes of materials and workmen, and the sources from which they come. The different shops and factories in the town that supply materials should be noticed. Sometimes much of the work is done in these shops, and is brought ready prepared to the house, as with the tinners, the plumbers, the painters, and the planing-mill men.

Still a fourth trip may be made to observe the interior finish and decoration. This also requires expert workmen, from the varnisher and painter to the frescoer and decorator. The fine woods used, the hardware for locks and hinges, the mouldings and paper-hangings, the finishing of hard-wood floors, the cupboards, drawers, and panelling, the wash-basins and bath-tub, the radiators and heating apparatus, furnish most important object-lessons in direct relation to the uses of life.

The materials and tools and skilled workmen in all the different processes of house building are deserving of careful observation and later illuminating discussion in the schoolroom. Even the hours of labor and wages of the workmen, their expert skill,

their dependence upon one another, and their importance to all of us should be definitely brought out. These are fundamental things in the private life of every human being and in the larger public interests of every community.

The different trades involved in building, as those of masons, carpenters, tinners, plumbers, painters, millmen, contractors, and architects, may be thus appreciated, each in his specialty. We may not, indeed, with younger children, go into the matter of strikes and labor unions, but we are laying a good foundation for understanding these things a little later. House building is a natural, familiar centre from which we can move out to a large number of the common occupations of men in every community. It will be desirable later to make excursions to these places, as to the brick-yard, the sawmill, and planing-mill, the carpenter shop, the stone quarry, and the hardware store.

All of these, however, point outward into the great world beyond from whence these building materials come, to the forests, iron mines, quarries, and factories, many miles it may be from our home.

Each excursion needs to be worked over in the schoolroom with such descriptions and drawings as to bring out the power to express clearly the meaning of the facts observed.

## Excursion to a Blacksmith Shop

Before taking children to a blacksmith shop it is well for the teacher, as in most excursions, to visit the shop and study its work.

The children enjoy seeing the blacksmith working at the forge or hammering the red-hot iron upon the anvil. The use of the bellows for increasing the draft and heating the iron arouses their interest. The kind of coal used and where it is obtained should be known. It comes in lumps, but breaks up very fine at the touch of the hammer.

When a horse is brought into the shop to be shod, a pair of shoes of the right size is selected, according to the size of the horse's foot. The blacksmith does not make the shoes and shoe nails as formerly, but they are sent him from the large factory. Yet the iron shoes that come from the factory have no toes or heels, so necessary in holding the foot firmly on icy or slippery ground. The children see the blacksmith heat the horseshoe to a bright heat, then, on the anvil, turn down and sharpen the heel points and weld on the toe point. After that the shoe is cooled. The blacksmith takes the horse's foot between his knees and trims the hoof. By questioning the smith we find that the hoof grows constantly, and the whole is renewed once a year. The old hoof needs to be trimmed with a knife, and the new shoe is fastened on firmly by wrought-iron nails, which are driven through the edge of the hoof and clinched on

the outside. About once in six weeks or two months the shoes need to be taken off, sharpened, and fitted on again. The advantage to the horses is the avoidance of tender feet, greater firmness upon the ground in walking, running, and hauling, and in winter time especially the avoidance of slipping and falling, and perhaps breaking the legs.

The cost of shoeing a horse on all four feet with new shoes may be $1.50. For resetting old shoes, one-half this. But the value to the farmer or teamster of having his horses well shod is much greater than this. The blacksmith is thus seen to be a very important workman for the farmer, the drayman, the liveryman, and for any one using horses.

The tools used by the blacksmith are worthy of some special examination. The long tongs for handling hot iron, the anvil and hammers and wedges, the knives for trimming the hoofs, the peculiar working of the bellows, the pincers for drawing nails, and the files, — each has its peculiar use and fitness. Then the skill and ease with which the workman performs his work should be realized to some extent by the children.

The sources from which the blacksmith gets his tools, horseshoes, nails, anvils, and forge will also show his dependence upon others in the simple system of economies.

Quite a number of the things seen at the blacksmith's are suitable objects for the children to draw, as the forge, anvil, tools, and even the blacksmith

shoeing a horse. It is not uncommon to find the children making an interesting group of drawings on paper or on the blackboard as the result of such a visit to the shop.

In this shop also the iron parts of wagons and buggies are often repaired, the tires of wheels are set and tightened, and springs are fixed. Oftentimes a blacksmith's shop and a wagon shop are combined, as the wagon maker and blacksmith are necessary to each other in the construction or repair of a wagon. The tools and machines necessary for this kind of work form an additional study of interest and value.

### The Planing-mill at Ithaca, New York

Near the business centre of the town is a mill and lumber-yard where the contracts are made for supplying the rough and finished lumber (mill-work, etc.) for frame buildings. It is just such a mill as one finds in any of our larger and smaller towns, and is designed to supply contractors and builders with the materials for their constructions.

On the first floor of this shop we saw piles of unplaned lumber close by a group of three machines, the first of which is called a *surfacer*. The man shoves the board between the rollers and it is gripped by the machine, which passes it through, planing off to a smooth surface the top side of the board. The next adjacent machine receives a board in the same way and planes both sides and the two edges, in once

passing it through. It is called a matcher, because it is used also to cut the tongue and groove on the edges, so as to cause them to match as in the case of good tight flooring.

The third machine receives an inch board already planed on the sides and edges, and setting it on edge, presses it against the teeth of a large circular saw, three feet in diameter, which slices it into two thin half-inch boards. This is called a re-saw. All these boards are now finished and ready for use.

On the same floor is a rip-saw, which is a small circular saw, whose edge whirls an inch and a half above the surface of a bench, and rips off the edges of the boards to give them a uniform size.

Passing up the stairs to the second floor, two lathes are first seen, for turning out round posts and other circular forms. Near by is a scroll-saw, working vertically and used to saw out ornamental and bracket work. Several machines also which are called *knives*, for cutting out mouldings, the parts of doors, window casings, etc., which need to be mortised together, are seen. It is also observed that two heavy oak boards are glued and tightly pressed together in a frame or press supplied with strong clamps. When dry the boards are run through a planing-machine, which gives them a smooth, almost polished, surface. They are to serve as the top of a long oak table. These presses and clamps are used also in putting together the panels and sides of doors which are manufactured here.

On the third floor we see the finishing work upon fine oak casings and cupboards and also the glazing of windows.

Passing into the basement, we enter the warm engine room, where the large wheel of the engine is seen, carrying the great belt that connects with the main shaft, running through the shop and giving power to all the machines. The furnace room is also visited, and we observe the engineer shovelling the pulverized anthracite coal into the fire. Close by is also a bin, into which the shavings and sawdust and waste pieces of board, edges, etc., are constantly tumbling. While studying the machines on the first and second floor we noticed, covering each machine, was a large tin or zinc hood with a pipe rising from it. All these pipes meet in one larger one near the ceiling, and in this is a large whirling fan (or wheel) which sucks the air so swiftly through these pipes that all the sawdust and shavings are carried away from the machine as fast as made and driven into the bin, where they are fed into the furnace. The engineer tells us that half of the fuel needed for running the furnace is supplied from the sawdust and other waste of the mill.

Back of the rooms for the machines are large storage rooms for finished lumber, mouldings, posts, and fine material already worked over in the planing-mill. There are also large sheds in which the sorted lumber has been stored. There is also a stock of lime and brick which are handled by this company.

The engine which runs all the machinery of the mill is of seventy-five horse-power, and the engineer looks after the furnace, engine, and belting and general machinery of the mill. Occasionally a large belt slips off, and all the work stops half an hour or more till it can be put on again. Sometimes a machine breaks or needs repair and is thrown out of gear till fixed. It is necessary to keep all the different parts of the machinery working together and in harmony if the work is to go on smoothly and continuously.

About sixteen men are employed as workmen in this mill. In each of the three rooms there is a foreman who looks after the men and machines in that room. A good foreman will see that the machines, belts, etc., are kept in good working condition, and that the workmen do their work well, with little waste of material, for an awkward workman may easily waste a great quantity of fine lumber. The foreman receives better wages, of course, than the helpers. The men, however, are not required to serve a long and difficult apprenticeship to this work, as in the more skilled trades.

In supplying finishing materials for houses, such as doors, casings, window-frames, stairs, sideboards, etc., this company is accustomed to buy ready-made at large factories stock doors, frames, etc., which are of ordinary conventional sizes and material. Large companies which manufacture thousands of doors of a single size and material can produce them much cheaper than a small mill turning out only a few.

This mill, therefore, is accustomed to make only those doors and frames which are peculiar or unusual in size or shape, material, etc., that is, special orders. For these, of course, it can charge a higher price.

In selling its goods this mill company must compete with other mill companies in Ithaca and in the neighboring towns. Contractors and builders usually allow two or more mills to bid on the lumber and materials needed to complete a house. The lowest bidder, if a responsible mill company, is apt to get the contract. This mill company supplies builders with materials, not only in Ithaca, but in the surrounding country as far as thirty miles, shipping the prepared material by rail or occasionally by boat, or sending it by wagon to near places. About half of the sales of this company are made outside of Ithaca.

The sources from which the mill draws its lumber are various. First of all the company owns several stretches of woodland within a radius of ten or twelve miles near Newfield and other places. It has also a portable sawmill which it transports to one of these woodlands, where the available trees, spruce, basswood, and oak, are cut down, sawed into boards, and shipped to the mill at Ithaca. Much of the fine lumber used at this mill comes from Buffalo, and is shipped by rail or occasionally by canal-boat along the Erie Canal and its branch to Lake Cayuga. Some of the pine lumber comes from Canada, some from the lake regions. Yellow pine comes from Norfolk, Virginia, and from the region north of New Orleans, and is sent

by rail. Oak, walnut, and other hard woods come from Nashville, Tennessee, also from Indiana and the Ohio Valley. Cedar and redwood are shipped from Washington state by rail to Duluth, thence by boat to Buffalo, and then by rail or canal to Ithaca. Almost all kinds of hard woods and pines, hemlock, etc., are used in this mill.

The amount of capital required to run such a mill is perhaps $50,000.

A small mill like this is probably a better object-lesson for children's study than a larger mill. All the essential facts are observed in a simple form. There is little danger in visiting this place, and the whole connection of parts can be worked out.

In studying the different machines and parts of the mill, it is desired that not only the action of the particular machine, but its relation to the mill as a whole, be seen, and in reviewing the mill as a whole, the parts, machines, rooms, and processes be brought into a connected whole, so far as it admits of this.

It is well to look upon the whole establishment from the standpoint of the owner, — the means used to secure effectiveness and economy, and all the plans and devices for working out a profit. The interests, wages, and skill of the workmen should be looked into. This is one of the best forms of real social study.

It is not difficult to show that such a business has important relations to the whole life and activity of the people, to the need for well-constructed homes,

stores, schoolhouses, etc., in the town and region about, and to the great industries, as lumbering, factories, and commerce, in many parts of the country. The mill business is one which must repeat itself, in essentially the same forms, in every town and city, and in the lumber-producing regions all over the nation, in fact in all the countries in the world.

### The Cypress Sawmill at Palatka, Florida

A large sawmill for the production of cypress lumber is located on the St. Johns River at Palatka,

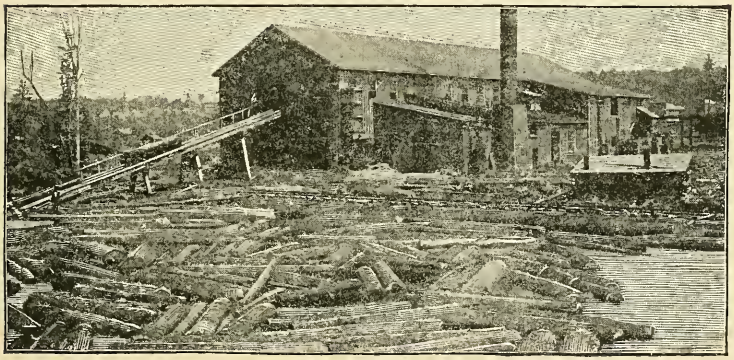

Fig. 9.
A sawmill.

Florida. The logs are supplied to this mill from the cypress swamps which line the banks of the St. Johns and its tributaries. A large quantity of these logs may be seen floating in the water of the river at the foot of the mill. From the water's edge, slanting upward

to the main floor of the mill, is a narrow track with an endless chain. This endless chain is supplied with hooks which grip the end of the log as it is pushed upon the lower end of the track. One after another the logs are carried by this endless chain up the slide into the mill. Having passed into the mill, the logs are rolled down on either side and collected before two log carriages.

Suddenly a huge iron arm from below rises and seizes the nearest log, and lifts it on to the carriage, where it is tightly gripped by iron clasps and held firmly in position. Three men standing upon this carriage work the iron levers by which the log is handled. This carriage stands upon a track and carries the log and the men back and forth, forcing it against the teeth of a great band-saw which, every three or four seconds, slices off a huge board from the log. By means of the levers, the men are able to whirl the log instantly into any position, so that the saw will slice off a board of any desired thickness from any one of the four sides of the timber. As these boards are sawed off they are carried by rollers farther into the mill. Men stand ready to receive them and pass them up against small circular saws, called edgers, which trim off their rough edges and bring them into uniform shape.

Still farther on the rough or useless ends are taken off by other saws, and the boards are distributed according to their size and quality to trucks standing upon tramways. When one of these trucks is well

loaded with boards of uniform quality, it is hauled by a mule out over the track which is built upon a high trestle to some distant part of the lumber yards. Most of these piles of lumber are built upon piers stretching far out into the river, with water channels between into which the boats may come for loading.

At every point in the process just described, men are required to give direction to the logs or lumber. At the foot of the slide and chain which carry the logs into the mill are two men with long poles who guide the logs through the water till one end is lifted by the chain on to the slide. As the logs enter the mill, men stand ready with cant-hooks to tumble them into position. The heavy work is done by the machinery, which, however, is directed by men at each point.

But a large portion of the logs, or parts of logs, is not fit to make into such boards, and as it passes from saw to saw the blocks and parts of boards suitable for shingles and laths are picked out and sawed into the sizes required for the shingle and lath machines, which are busily at work near by. In this way a much greater economy of material is secured. There are, however, many edges and short board ends and rotten pieces which are not good for any of these purposes, and are sent either to the furnace room or to the waste pile, where a number of one-horse carts are being loaded at twenty-five cents a load, and the material sold throughout the town for fuel.

A large part of the sawdust which is constantly produced at the various machines is carried on endless belts, supplied with pockets, to the furnace room, where it supplies the fuel for running the furnaces and the engines. A large portion, also, of the board ends and edges are collected and used in the furnace room. But so great is the amount of waste material, more than is needed in the furnace rooms, that a considerable part of the waste stuff is carried to a large cremator, where a fire is kept burning constantly to consume it. This cremator looks like a large, sheet-iron chimney, a hundred and twelve feet high and twenty-eight feet in diameter. Another part of the waste bark and sawdust has been used to build up the yards and piers, extending far out into the river, upon which the lumber is piled.

On two sides of the sawmill are two large engine-houses with their furnace rooms, one of which runs the machinery of the sawmill and the other that of the planing-mill which stands close by. Near the planing-mill is the dry kiln, where the lumber is brought from the yards and thoroughly dried by a process of steam heating. The logs which are sawed up in the sawmill, having lain long in the river, are thoroughly water-soaked, and the boards as they come from the mill are dripping wet. Those which are to go through the planing-mill must first be thoroughly dried and seasoned. In the planing-mill, not only are the boards planed on one or both sides, but all kinds of moulding, matched lumber, panels, and finishing

material are worked out. Many men and machines are employed in working up the rough boards and timbers into finer products in the planing-mill.

In a large lumber mill like this a great deal of machinery is used, and to provide for repairs and constant changes, and installing of machinery, a regular machine-shop has been built near the engine-house, where four skilled machinists and an expert overseer are constantly employed. This shop is fully equipped with the best machines for working in metal. Near by is also a blacksmith shop for working in metal, where a great many of the simpler repairs are made. Upon the third floor of the mill is also a large saw room where the different saws, scores of them in number, are constantly repaired and sharpened by experts.

Of course much pains must be taken in a large mill to prevent fires. Besides forbidding the men to smoke on the premises, and requiring from them great care and watchfulness, guards are appointed and other provisions made. City water-mains run through the grounds of the mill, and the power of the city waterworks can be turned at any moment to the uses of the mill. In addition to this the company has a large fire-engine and a full equipment of hose, and is able to run the engine out upon the docks should fire be threatened. Patent fire extinguishers are also hung in many places about the mill for use in emergencies. In addition to this the mill and lumber-yards are kept well insured against fire.

In order to secure the mill a constant supply of logs, the mill company has bought up thousands of acres of swamp lands (about one hundred and eighty thousand acres in all) along the St. Johns, the Oklawaha, and

FIG. 10.
Sawmill "hands."

other branches of the St. Johns, where it establishes logging-camps for the felling of trees and collection of the logs. At one of these camps the company has sixty men regularly employed. Logging in these swamps is carried on in a somewhat peculiar way.

The log-puller, consisting of a steam-engine and chain for dragging the logs from the woods to the edge of the river, is much in use. Such a log-puller will drag a big log a mile through the swamps, crushing and uprooting the smaller trees in its course and making a track which opens a wide vista through the woods.

In order to bring logs from a greater distance from the river a railroad is sometimes built into the swamp for a distance of five or six miles, and the log-pullers are employed in dragging the logs to the line of this track, where they are loaded on cars and hauled by a steam-engine to the brink of the river. This company has two railroad logging-camps. Logging in the cypress swamps is dangerous because of the accidents from the log-pullers which occur at times, and because of the dampness, and of fevers which are common in the swamps. Negroes are much employed in the logging-camps because they are well adapted to the work in the swamps. These fevers are especially apt to attack those not accustomed to this kind of life.

At the brink of the river, log rafts are formed which are towed down the river by a steamer owned by the mill company to the big mills at Palatka. The company has a number of these logging-camps at work most of the time so as to have always on hand an abundant supply of logs for the mill. The work of the mill is carried on both winter and summer, and on account of the mildness of the climate

of this section, the winter months are the best season for work.

The lumber produced by this mill is mostly shipped to the North, that is, to New York, Philadelphia, and other cities. The large lumber firms in these cities send schooners to Florida to get the lumber and deliver it at the Northern wharves. These three-masted schooners are sailing vessels which can offer much cheaper transportation than the railroads. The mill company at Palatka delivers the lumber to the schooners, which come directly to its piers, and has no further responsibility for it.

Just across the street from the sawmill is a large planing-mill, which makes sashes and doors for shipment to the Northern markets. A good share of the lumber used by this planing-mill is sold to them by the sawmill company. Besides the shipment of lumber by water two railroad tracks run into the yard, and cars are here loaded for the Southern market.

A large number of workmen is employed about the mills, in all about one hundred and fifty. The skilled engineers, saw filers, and machinists receive, of course, considerably higher wages than the ordinary workmen. The men work efficiently in the handling of the machines and lumber, and it is an excellent training in prompt and systematic work. The mill also employs one hundred and fifty men at its logging-camps, and thus furnishes work and support to a large number of families.

It is noticed that cottages are being built in the

neighborhood of the mill for the accommodation of the working families, while the owners and overseers occupy houses in various parts of the town. The presence of these families makes better trade for all the stores and shops of the town, as well as for the banks and for business people of all kinds.

The unskilled laborer receives $1.10 per day of ten hours. Some of the laborers have saved up money and have paid for their homes. When, because of repairs or for other reasons, the mills shut down for a few days, the shops and stores in town at once feel the loss of customers and desire to see the mills going again.

The property of the mill company is taxed for the support of public schools and for other city needs, thus largely increasing the amount of money that can be used for these purposes. This large mill company is therefore an important factor in the general prosperity of the town.

The study of a sawmill in its work and in its various relations to the town, to the logging-camps, and to the markets, is one of the best topics for children, because the product is bulky, and because the method of handling it, as well as the machines and processes employed, can be easily observed and understood by them.

Excursions to such a sawmill can be made in a great many parts of the country, because the lumber production is widely distributed through many of the states; for example, all along the Mississippi and many

of its tributaries, in the Eastern States and Alleghany Mountains, in the Gulf States, in the Rocky Mountains, and on the Pacific Slope. It involves the production of raw material, also manufacturing, machinery, and commerce by land and water, and it is not difficult to understand the causal necessities that control the business.

### The Warwick Pottery at Wheeling

This pottery stands near the river bank and the tracks of the railroads, where cars pass by and either bring the clay needed or afterwards carry away the manufactured chinaware. The product of this mill is known in the market as semi-porcelain, or porcelain granite.

Close by the bins where the different qualities of clay are stored stand the freight cars from which the white powdered clay and ground stone are shovelled into the bins. There are eight of these bins, containing different kinds of clay or kaolin, and powdered or ground stone.

The best white, almost waxy, kaolin comes from England. A yellowish powder comes from the kaolin beds of Florida. Another white sort comes from Germany. The ground flint and spar come from Vermont and Maryland. A blackish lumpy clay, called ball-clay, comes from England. It is tough and gluey, and gives the mixture of these various clays a sticky, coherent value in moulding and work-

ing. The ground stone is fusible and melts in the heat, binding the parts together.

A small truck runs on a track in front of these bins, and is loaded in turn with a charge of clay from each bin. These charges are all shovelled into the hopper-like top of the agitator, a large tank which receives these clays and thoroughly churns them in water admitted through a pipe. When these clays

FIG. 11.

The largest pottery in the United States, East Liverpool, Ohio.

and water have been completely mixed, a faucet is turned, and the *slip*, or clayey water, is poured over a sieve which removes any large particles, and the pure slip is poured into a press machine, supplied with vertical layers of rough cloths, through which the slip runs, leaving the clay, which forms in broad slabs of clay, the water having been squeezed out. These slabs of clay are taken out and piled in a heap on the floor. This clay is then fed into the pug-machine,

something like an immense sausage grinder, which grinds and squeezes the clay till all the air is taken out of it. The large cylinder-like chunks are cut off as they are squeezed from the pug-machine, placed on a revolving clay belt or elevator, and carried up two stories to the moulding room.

Fig. 12.
Using the potter's wheel.

The moulding room is supplied with a number of machines for moulding the clay into bowls, pitchers, dishes, cups, tankards, etc. One of these machines is a hollow mould placed on a wheel whirled by hand, and called a *whirler*. A chunk of clay is thrown into this mould and fashioned by hand to the shape of the interior of the mould. The inside of the mould gives shape to the outside of the pitcher or vase, and the hands of the workman shape the inside. The potter's lathe is also much used. A piece of clay is shaped into a cup on the end of the whirling, cup-shaped lathe. Next to these are the jigger machines, which work on the principle of the lathe, using a knife working on a pivot to shape the clay as it whirls on the wheel. A helper stands close to the workman, sup-

plying him with the piece of moulding clay ready for its use. In making platters and shallow dishes a mould is used made from plaster of Paris. The clay is pressed down upon the mould so as to give it the shape of the interior of the dish. The water in the clay is rapidly soaked up or absorbed by the plaster of Paris, and as the clay thus shrinks, in a few minutes it can be removed from the mould and set on a shelf to dry.

A different process of shaping tall, graceful vases and mugs is called *casting*. A hollow mould, whose parts are held tightly together by a hoop to prevent leakage, but open at the top, is filled with "soup," that is, a thin mixture of clay and water. As you look in at the top, you see the fluid mixture rapidly settling. The porous plaster of Paris mould takes up the water and the sides are plastered with a thick coating of clay, forming a vase or pitcher. When the water is all soaked away, or the final thick residue is poured off, the clay dries. After a quarter of an hour or more the hoop binding together the two halves of the mould is removed, the sides taken off, and the vase stands complete.

The handles of pitchers and cups are made separately upon a dye and fastened on by wetting, before the cups are dry. All the different products of the moulding process, such as plates, cups, bowls, pitchers, vases, etc., are set upon shelves and allowed to dry a day or longer before putting in the kiln for burning.

The kilns are large, circular brick structures, which

are filled with these products ready for the burning. The kiln, on the inside, is dome-shaped, and about twelve feet high and perhaps as many broad. It is shaped much like a cistern, but is built over a series of furnaces where fires are made whose heat rises and gradually fills the interior.

The dishes are not set directly in the kiln, but are placed in tub-like basins shaped from fire-clay, about the size and form of a small tin bath-tub. This little clay tub is about a foot and a half long and a foot wide, and the sides of it are an inch thick. The clay tubes are called seggars, and they are prepared and burned in this factory before using. Each seggar receives half a dozen or more cups or plates, the bottom having been sprinkled with sand to prevent sticking. If the seggar is cracked, the crack is filled with clay; and the upper rim is covered with a roll of wet clay upon which the bottom of the upper seggar is set so that each seggar thus becomes air-tight.

As the young men carry these loaded seggars into the kiln, balancing them easily upon their heads, they pile one seggar upon another till the column reaches the top of the kiln and is tightly wedged at the top to hold it firmly in place. When the kiln is completely filled with the seggars and their contents, the doorway is bricked up and plastered over, and the firing begins. The fireman must be an expert in applying the heat, as a whole kiln full of dishes can be ruined by heating too rapidly, or by too great and long-continued heat.

On the day we visited the pottery, one batch of dishes had just been taken out, which was distorted and misshappen by too much heat, and was worthless, in spite of all the labor expended upon it. The first large kilns in which the dishes are burned are called biscuit kilns, and the dishes are baked before they have received any glaze. After the burning process, which lasts day and night till complete, the fires are slowly slackened and very gradually the kilns cool, till, at the end of a week or more, the kiln is reopened and the dishes taken out and examined.

If the product is satisfactory, it is passed to the glazing room, where tanks of glaze in liquid form have been carefully prepared, and in this the dishes are dipped. The preparation of glaze and the dipping demand a skilled workman. This glaze makes the dishes smooth, hard, and impervious to liquids. The glaze dries and hardens, and the dishes are placed in a kiln the second time to fuse and burn the glaze.

After this second burning, the dishes pass into the inspection room, where all defects are noticed, rough spots dressed down and polished, and the dishes made ready for the decorating process. An iron tool, something like a chisel, is used to rub down and dress the rough spots, and sometimes a dressing wheel is used, by which rough places are ground down and smoothed.

In the decorating room, a copper plate upon which the design is engraved receives the purple ink,

and its designs are transferred by a press to thin paper. These little patterns on paper are then cut and pasted upon the dishes. After about fifteen minutes these papers are gently washed off with water, and the delicate designs are found clearly printed upon the dishes.

After this the further hand decoration of the dishes proceeds. Certain colors are given by a sprayer which throws or sprays certain tints upon the vase as it whirls upon a wheel. In another department girls are found, giving the edges of dishes a gilt decoration with brushes. A peculiar and costly form of decoration called decalcomania is produced by printing certain tints and devices on tankards and dishes.

When the various processes of decoration are complete, a third burning takes place in kilns, and the dishes thus receive the final form and color.

In the lower part of the building is the packing room, where large boxes and hogsheads are used for careful packing of these easily broken goods for shipment to many parts of the country.

This company sells its goods in all parts of the United States. Their travelling agents visit many parts of the country and sell orders directly to retailers. They ship chiefly by railroad. Their kaolin, clays, and ground stone come from England and Germany, from Maryland, Florida, Vermont, Carolina, and other states. The common clay used in making seggars is obtained near Wheeling.

The business of this factory falls into four chief

parts: (1) the clay work, (2) the glazing, (3) the decorating, (4) the office work. A foreman skilled in his business is in charge of each of these departments, and in addition to this, experienced and skilled men are needed to look after the furnaces.

At every point in the process there is danger of breakage and loss, and it is the business of the foreman to keep a sharp eye upon each part of the work assigned him.

The president of the company has the general supervision of all the various departments of the whole plant.

In this factory, besides the men, there are many young women and children at work, some of the boys and girls probably not more than twelve years old.

In addition to the points mentioned above, there are two other phases of work. The process of making the seggars out of common clay is like that of common stoneware, first by a grinding and mixing machine, then by moulding and baking.

The plaster of Paris moulds used so much in the shaping of chinaware are also prepared in the factory.

### The Akron Belting Company

This company is engaged in making leather belts for use in machinery, in mills and factories.

The power for running the machinery of this factory is derived from an overshot wheel, supplied with water from Springfield Lake, six miles from Akron (Ohio). This wheel is sixteen feet across and fourteen feet in

diameter, and when the water is turned on in full force, it gives an eighty horse-power. Usually the mill machinery employs fifty or sixty horse-power.

Passing first into the basement, we saw a cutter marking out the hides and cutting them with a sharp knife into broad strips. He is a good judge of hides, and of the parts best suited to make strong belts. The central strip is usually the most firm and durable, and the outer parts less so. The hides thus cut into strips of varying widths are put into a tumbling wheel, where they are soaked in water.

A scouring process follows in which the leather strips are slipped under a brush, supplied at each end also with a smooth stone which rubs down the leather. It is also scraped by hand to get rid of waste and roughness. To still more rub down the grain and give it a polish, it is placed under a glass rubber which polishes one side to a smooth surface.

The skins are brought to a table where they are rubbed with a mixture of oil and tallow, which is rubbed into the pores, so that the leather is said to be stuffed and dubbed. These greased hides are hung up and allowed to absorb this greasy matter, and the dry outer layer of tallow is then scraped off.

Each hide is also placed upon a stretching machine which draws it out to its full length, and in this stretched condition it is hung up and allowed to dry in a warm atmosphere. When dried, these strips of leather are not subject to much expansion or shrinkage.

When the leather strips are finally ready to be made into belts, each strip is of the same width, and the ends are cut off to give a uniform length; and at each end the leather is pared down to a thin edge, and these edges, placed end to end and spliced together, give a uniform thickness to the belt. Usually the belts are made double, with the smooth outside of the leather exposed on both sides. The inner faces are spread with glue with a brush, and the double layer is slipped under the clamps of an hydraulic press, where the glued strips are subjected to a heavy pressure. Usually the glue is strong enough to hold the strips together so that the band remains firm and flexible.

The spliced ends of one side are covered by the middle part of the other side as indicated in the diagram.

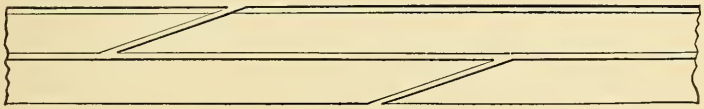

Fig. 13.

How belts are spliced.

This glue material is very carefully prepared from the bladders of codfish, obtained from Gloucester, Massachusetts, thoroughly mixed with ordinary glue, and boiled and kept hot for applying to the strips just before placing them under the hydraulic pressure. Two men work at each of these hydraulic machines and two strips of heavy belting are continually

emerging from the hydraulic press and are rolled up into large coils for storage in the stock room.

To strengthen still more some of the belts which are subjected to severe pressure in mills where there is much moisture, the spliced ends of the strips are riveted together with brass rivets.

Many belts are also made of single strips, glued together at the spliced ends. There are great varieties of belts in regard to width, from an inch to five feet. The belts are also of varying quality and strength, according to thickness or quality and part of the hides.

The hides used by this belting company are obtained from Baltimore. They are Western hides from the great ranches in Colorado, Texas, and Montana, or from corn-fed cattle of the middle West. These hides were shipped to Virginia, where there are large tanneries using the bark of the chestnut oak. This gives the strongest leather, such as is needed in heavy belting for machinery.

From Baltimore, where there are large wholesale leather houses, this leather is shipped by rail to Akron.

When made up into belts the product of this mill is sold largely to the cotton-seed oil mills in the Southern states, where they require a strong belting. These belts are also used in the cotton mills for producing cotton cloth. Many of the belts are also sold in the states of the middle West, as in Illinois, Michigan, and other states.

## OUTLINES FOR THE TREATMENT OF OTHER SHOPS AND FACTORIES

A Foundry.

1. The making of moulds; wooden frames, moulding sand; tools and skill of the workmen.
2. The models and the shops for making the patterns or models.
3. The furnace for melting the iron.
4. Drawing off the molten metal; pouring the metal into the moulds.
5. Various parts of machinery made by such castings.
6. Various kinds of castings, as stoves, water mains, farm machinery, etc.
7. Kinds of skilled workmen needed; pay of workmen.
8. Uses of scrap iron and pig iron for the furnace.
9. Importance of the foundry to other factories.

A Cooper Shop.

1. The staves and hoops used in barrel making.
2. The frame and tools used in setting the barrel.
3. Putting on the hoops and inserting the head.
4. Steaming the barrel in the cylinder over the stove to soften the staves.
5. Various uses of barrels; kinds of barrels; importance of barrels in many kinds of business.

A Carpet Weaver.

1. The parts of the loom.
2. Placing the warp; the harness; the swinging beam.
3. The shuttle and its action.
4. The weaver at his work.
5. The day's work and its profit.

A Stone Quarry.

1. Location of the quarry.
2. The rock strata.

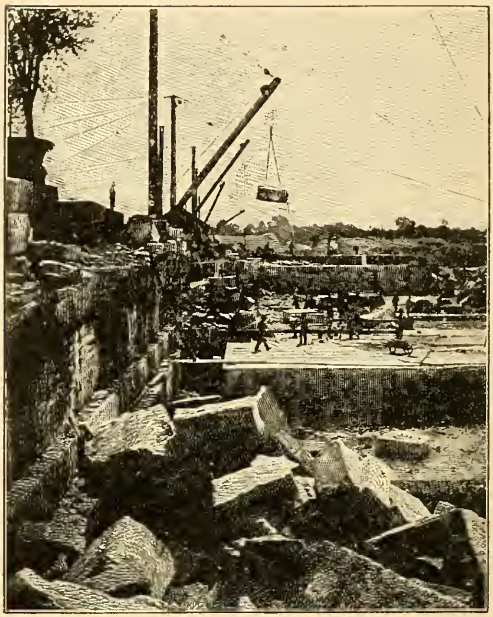

FIG. 14.

A stone quarry. The stone is cut out with saws.

3. Drilling and blasting.
4. Limestone quarry; lime-kiln.
5. Hauling stone; heavy loads.
6. Uses of the stone.

A BRICK-YARD.

1. The clay pit; depth and quality of clay bank.
2. The mixing and grinding of the clay; machinery used; engine and belt.
3. The press, and moulding of the clay.
4. Stacking of damp brick in the yards or under a shed for drying.

5. The brick-kiln for burning the brick; time, labor, and fuel needed in burning.
6. Value of brick by the thousand.
7. Shipment and sale.
8. Pressed brick and paving brick.

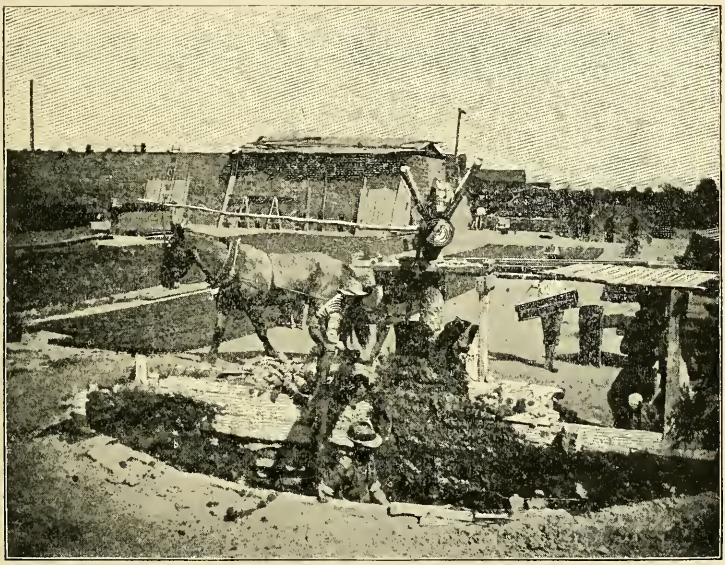

Fig. 15.
A brick-yard.

A Fruit Store.

1. Kinds of fruit in the store; fresh fruits and canned fruits.
2. Regions from which bananas, grapes, oranges, pineapples, apples, peaches, etc., are obtained. Use large map to locate these regions.
3. Losses in the fruit business.
4. Local fruits obtained, as berries, cherries, etc.
5. Sources of canned fruits.

A Grocery Store.

1. List of chief things sold in a grocery.
2. Sources of chief articles as flour, sugar, vegetables, coffee, tea, crackers, fruits, cheese, molasses, oil, salt, spices, etc.
3. Traffic routes by which groceries reach our town.
4. Expenses and losses connected with the grocery business.

A Bakery.

1. The bake oven.
2. The kneading trough.
3. Cakes and pies.
4. Amount of bread and pastries made.
5. Comparison with the home bake oven and kitchen.

A Shoemaker.

1. The bench and tools.
2. Kinds of leather, lasts, thread, etc.
3. Skill of the shoemaker.
4. Repairing shoes.
5. Where the leather and tools come from.
6. Daily profit of the shoemaker

A Tin Shop.

1. The making of a tin cup; soldering, soldering tools, and stove.
2. Making a stovepipe; machines used.
3. Kinds of tinware made.
4. The work of the tinner on buildings.

A Tannery.

1. The hides brought to the tannery.
2. The vats and length of time needed.
3. The use of bark and other tanning materials.
4. The hair from the hides and its use.
5. Effects of tanning on leather; sources of leather.

A Shoe Factory. (For older classes.)

1. Kinds of leather and raw material used.
2. Trace the various parts of the process in making a pair

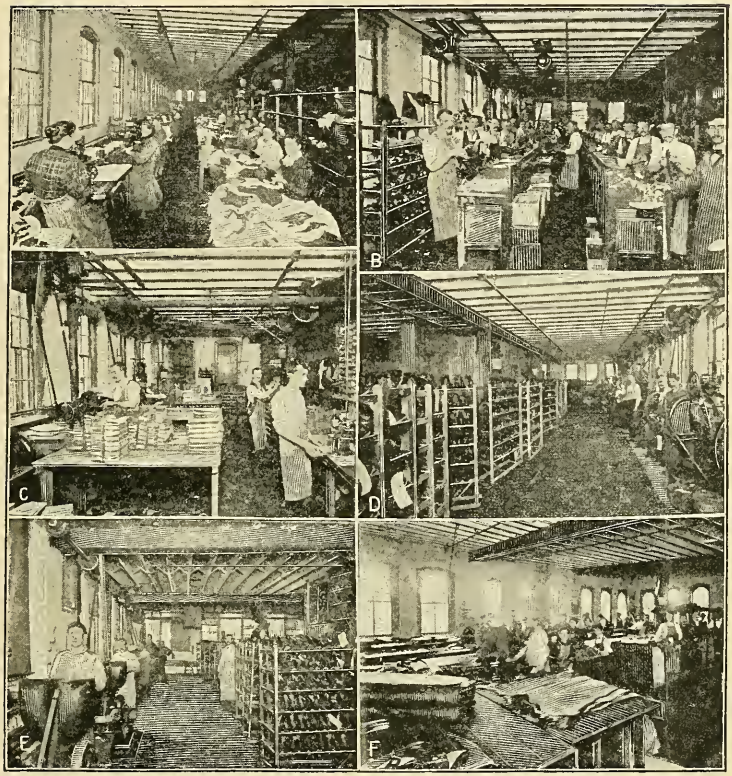


FIG. 16.

Some small pictures of a shoe factory, showing the men and women at work making shoes. Tell what you see in each.

of shoes. Machines used in cutting and sewing uppers, making linings, soles, and heels, and fastening them on, polishing and finishing.

3. Division of labor and skill needed.
4. The finished products.
5. Machine power needed, and how applied.

6. Sale and shipment of shoes.
7. Kinds of laborers in a factory; work of women and children; wages paid.

A Mill and Mill-race.

1. Location of a flour-mill. Grain used.
2. The mill-race and how the water is obtained from the river; the dam and mill-pond.
3. The mill-wheel and how the power is transferred to the machinery.
4. Use of a steam-engine instead of water power.
5. The millstones or roller process.
6. Sale and shipment of flour.

A Woollen Mill.

1. The great bags of raw wool.
2. Process of cleaning and washing the wool.
3. Combing the wool and spinning.
4. The power loom; weaving of woollen blankets and woollen cloth.
5. Dyeing and coloring.
6. Wholesale and retail selling.

A Printing-office.

1. Setting type; kinds of type; skill of type-setters; leading.
2. Putting type pages or columns in the chase.
3. The hand-press and its work.
4. Printing a newspaper or pamphlet.
5. A power-press and its work.
6. The linotype machine.
7. Job-printing.
8. Book-making and binding.

A Canning Factory.

1. Vegetables and fruits brought to the cannery, as corn, tomatoes, berries.
2. Slicing the corn from the cob; cooking the corn or tomatoes.
3. Filling the tin cans.

4. Sealing the cans.
5. Storage of canned goods; shipment.
6. Relation of farmers and fruit growers to the canning factory.

A Furniture Factory.

1. Desks, tables, chairs, and cases made.
2. The kinds of lumber used.
3. The planing-mill; frames and presses for gluing and fastening panels and parts of furniture.
4. The lathe and turned work; carved work.
5. Making chairs.
6. Finishing, varnishing, and upholstering.
7. Cane and leather work.
8. Wholesaling and shipment.
9. Sources of lumber supply.

A Department Store. (For older classes.)

1. Size of the building.
2. Arrangement of the goods in separate departments, with head salesman for each.
3. Visit to one or more of these departments, as that for carpet or chinaware.
4. Mode of collecting money for sales.
5. Visit to the storage rooms where stocks of goods are kept.
6. The elevators and stairways.
7. Number of employees in a department store.
8. Convenience and advantage of trading in such stores.

A Machine Shop. (For older children.)

1. Engine-house.
2. Machines for ironwork, planes, drill machines, lathes.
3. The foundry. The furnace, fuel, pig-iron, etc.
4. Skilled metal workers; their wages and hours.
5. Boiler making.
6. Repairing engines and machinery.
7. Sources of pig-iron, steel, boiler plates, and other materials used.

## CHAPTER III

### COMMERCIAL TOPICS

#### Visit to a Three-masted Schooner

At Palatka, Florida, the children enjoy a visit on board a three-masted schooner. Palatka is about seventy miles from the mouth of the St. Johns River, and fifty miles south of Jacksonville. The St. Johns in this part of its course is a broad, tidal river, spreading out at times to a width of two or three miles, and with about eleven or twelve feet of water at the shallowest parts of its course. Having passed the shallow bar at the mouth of the St. Johns, the sailing schooners, with their cargoes of coal from Philadelphia or Norfolk, or with barrelled fertilizer from New Jersey, are drawn up the river by steam tugs, and deliver their freight at the wharves at Palatka. There is no coal in Florida, but it is shipped in from the North, to be used in gas plants, factories, and for heating. The fertilizer shipped from the North is much used for orange groves and for truck-farming, as the sandy soil of Florida needs strengthening.

Sometimes three or four of these schooners are seen at a time unloading their wares, such as coal, machinery, or fertilizer, which are stored in large warehouses along the docks.

They are then prepared to take on the cargoes of cypress lumber, which stand in great stacks on the piers joining the big cypress sawmill at Palatka.

Throughout the extensive swamps bordering the St. Johns and its tributary streams are forests of cypress. The logs from these swamps are cut and hauled by steam log pullers to the edge of the stream. From these logs rafts are formed, which are towed down the river by rafting steamers to the sawmills at Palatka or elsewhere.

Sometimes the schooner is loaded directly from the docks, but often it is moored well out in the river, and great barges or flatboats are loaded with lumber at the lumber stacks and then towed alongside the schooner. First the hold is filled full of lumber, and the hatches are put down, and the whole deck between the cabins is stacked full and well braced, so that the lumber is held firmly in place in case of stormy weather.

To board one of these schooners as it lies at anchor in the river is the delight of children. Sometimes it lies alongside the dock, and a pair of steps is set out so that we may walk over the railing, or again, it lies some hundred yards from the shore, and we must take a rowboat, paddle to the ship, and climb up the rope ladder to the deck.

Captain Oliver, a man who has been fifty years upon the sea, met us on the deck as we climbed over the railing. We had met him on one of his trips the year before, and after an introduction to the

boys he began to explain the arrangements of his ship. It was a wooden vessel of some three hundred and fifty tons burden, as registered, but in case of need he was allowed to carry five hundred tons. In his recent trip to Providence, Rhode Island, his ship had come down "light," that is, without a cargo. The lumber firm in Providence wished as speedily as possible a cargo of lumber from Florida, and were willing to pay him for going out empty. He had been seven days sailing from Providence to the mouth of the St. Johns, with favorable wind and weather. Sometimes he loaded for his Southern trip in Providence, New York, Philadelphia, or in the Chesapeake.

The older boys moved quickly about the deck, examining the masts and rigging, the bulwarks, anchor and anchor chain, the capstan, compass, wheel and tiller, and cabins at either end of the ship. Of course they were anxious to climb the rigging or rope ladders leading from the side of the vessel to the top of the mainmast, and some eighty feet above the deck. The old captain gave them some wholesome advice not to look downward in their climb, and away they went to the dizzy height.

The captain took us down the short stairs to his cabin, consisting of dining room and sitting room and berths. The floor was well carpeted, and the sitting room was comfortably supplied with a large office desk, sofa, easy-chairs, mirror, and all the conveniences of a pleasant home room. On one side, partly

hidden by curtains, was a broad and comfortable berth. A second berth was provided for any one he might take on the voyage with him. Adjoining this was the dining room, where he and the mate took their meals. Two sleeping berths opened also from this room, and the china closet. The dishes were set either in little boxlike places where they could not tumble about, or, in case of the cups, were hung from hooks at the top of the cupboard.

At the other end of the ship, with the long deck between, were the kitchen and bunks for the crew. The steward or cook is an important man on shipboard, and when the captain gets a good steward he prefers to keep him. A cook-stove in a tiny room just big enough to turn around in must answer his purpose; and next to this is a small kitchen, where he prepares the meals for the captain and crew.

There are five men in the crew besides the mate, and usually a new crew is made up every time the vessel starts out on a voyage. It usually takes them ten days or more to land the cargo and take on a new load for the return voyage. The crew does not care to lie idle for this time, as they are not expected to do the loading and unloading. The sailors hire themselves, therefore, to the first outgoing captain.

In coming South just before winter sets in, many sailors are willing to engage for a trip to Florida without pay, so as to reach a warm winter climate. In the spring, likewise, they are glad to get back to

New York or Philadelphia, and crews can be secured at Jacksonville for their board and passage.

Of course the first care of a captain after leaving port is to find out the character of his crew, to get them sobered up, if necessary, and find out what they can do in furling sails and managing the ship.

The original cost of a three-masted schooner like that of Captain Oliver is about $20,000. Such a vessel, well built, will last about twenty years, then it will have to be dry-docked and completely repaired at a cost of about half the original price. This vessel was built by a shipbuilding firm at Bath, Maine, much of the lumber coming from the Maine woods, but the tall masts were brought from the forests of Oregon or Washington. The captain was half-owner of his vessel, and received a regular salary as captain, besides his share in the profits. On account of the constant danger from shipwrecks, the yearly insurance on these vessels is about eleven per cent of the value, besides the insurance placed on the cargo. Captain Oliver told us of one shipwreck he had suffered by being driven ashore on the coast not far from Cape Hatteras.

The crew while on shipboard are kept constantly at work, cleaning the decks, repairing the sails or rigging, painting or renewing the floors, etc. The rough usage to which the ship is exposed makes it necessary to be constantly repairing, calking, and renewing the battered parts.

The vessels being built at the present time are

much larger, as it is found that the large vessels are more profitable than the smaller ones.

When the vessel at Palatka is fully loaded with lumber, a steam tug draws it down the river past Jacksonville till it crosses the bar at the mouth of the river and spreads its sails to the ocean breeze.

The captain of a schooner seldom gets to see his family, and then only a few days at a time. Leaving the ice-blocked harbors of our Northern ports in mid-winter, in ten days or two weeks he is coasting along the sunny shores of the St. Johns, where ice is not seen.

Captain Oliver has been so many years upon the sea that he does not feel at home upon the land. When the winds are freshening and the sails are spread, he feels in his element. He makes an occasional visit to his wife and grandchildren in Maine, but he must soon hasten back to his cabin house on the schooner.

There are many places along our coasts and inland waters where children may visit vessels or steamers plying between their home city and distant ports. The fishing vessels sailing northward to the fishing grounds from the New England ports may be named. The trips of vessels carrying bananas and other fruit from Jamaica and the West Indies to New York and New Orleans, ships loading with cotton for New York and Boston, grain vessels from Galveston to the Northern cities or to Europe, the loading and shipment of ship's supplies from Savannah and other Southern cities

for the North. On the Pacific coast the shipment of lumber from Puget Sound. The voyages from Puget Sound and San Francisco northward. The exchanges by ship between San Francisco and Hawaii or the Philippines. The steamboat trip from St. Paul down the Mississippi River, or from Pittsburg down the Ohio, or from St. Louis to New Orleans. The trips of lake vessels between lake ports furnish similar lessons. Later, the voyages between American and European ports will open up the ocean traffic upon a large scale.

### Crawfordsville, Indiana, as a Centre for the Free Gravel Roads

Crawfordsville, Indiana, a town of about seven thousand people, lies almost at the centre of a rich county in the west-central part of the state. Montgomery County, of which Crawfordsville is the county-seat, has about twenty-five thousand people, almost entirely engaged in farming. It is a rich agricultural region; the low grounds and fields have been well drained with tile, so that the land is nearly all well cultivated. There are still some strips of forest, but most of the land is in well-tilled fields and pastures.

About the court-house and in the central part of the town the broad streets are well paved with brick. An excellent quality of vitrified brick for paving and other purposes is made in the kilns in the eastern part of the town.

Leading out from the city in all directions are important wagon roads, by which the country people bring their farm products and live stock to town for sale and haul back the lumber, provisions, machines, groceries, etc., needed on the farms. Besides grain and live stock, the farmers also haul wood and sawlogs to town, where a sawmill receives logs and works them into lumber.

Just north of the town extends the valley of Sugar Creek, which flows westward into the Wabash River. The roads leading northward cross this valley and over bridges across the large creek, and then follow narrow, gorgelike valleys till they reach the upland levels beyond. Excellent roads have been built up these narrow valleys.

The roads of this part of Indiana, when not gravelled, are of clay, and become very muddy at certain seasons of the year, especially in the springtime, when the frost is coming out of the ground. All the roads now leading out from Crawfordsville are well gravelled, so that they give a solid, easy road-bed for wagons at all times of the year. Many also of the connecting roads between the chief thoroughfares have been gravelled. At the present time there are three hundred and fifty miles of well-gravelled wagon roads in Montgomery County centring in Crawfordsville. In their original construction these roads cost on an average $1500 per mile. In some places they have cost $3500 per mile, in others about $700.

Some twenty-five or thirty years ago, the farmers

of this part of Indiana began to form companies to build gravel roads along their farms; and in order to pay back the expense of road building, they were made into toll-roads, with toll-gates at intervals of two or three miles, where all travellers and teamsters were required to pay a toll or tax.

When the farmers had gotten their money back in tolls, the roads were turned over to the county, which agreed to take care of them, and they became free to the public, so that this county system of roads is now known as the "free gravel roads system." In keeping in repair the free gravel roads which have already been built, Montgomery County spends some $18,000 or $20,000 each year.

There are, however, many less important roads in the county which have never been gravelled. These are under the control of the separate townships. It is customary for the township supervisors to build new gravel roads wherever they are needed, at the expense of the township; and when the roads have been put in good condition as gravel roads, they are turned over to the county, which assumes the expense of keeping them in good repair.

But in some cases the county itself has assumed the expense of first constructing the roads. In these different ways the number of miles of gravel road under county control is constantly increasing. When a new gravel road is to be built at the expense of a county, it is carefully surveyed by the county surveyor. The amount of grading, and the number of

loads of gravel are definitely estimated in cubic yards, and then contracts are let for the building of the roads. All this work is done under the general management of the county auditor, and there is considerable expense for clerks, book-keeping, and management.

In the construction of these roads in low and swampy places the road-bed is sometimes graded up three or four feet before the gravel is put on, while the hills are cut through or levelled down, so as to bring the road, somewhat like a railroad, to a more common level. The dirt from the roadside, being thrown toward the centre, leaves a ditch on either side for water and drainage. The gravel needed for these roads is obtained from gravel pits as near as possible to those parts of the road which are being constructed. These gravel beds are found pretty well distributed all over the county. Gravel in the beds is sold at from ten to twenty cents a load. This, together with the cost of hauling, makes the average expense about seventy-five cents a load. These gravel roads have been so extensively built about the county that good coarse gravel has become somewhat scarce, and it has been necessary to dig deeper, sometimes to the depth of fifteen or twenty feet, to secure good gravel. In these holes, of course, the water collects, so that it is necessary sometimes to use machines for scooping the gravel from under the water. In other parts of the state, where gravel is less easily obtained, the roads are sometimes built with broken and crushed stone.

Heavy loads, such as logs, stone, wood, grain, and

coal, are apt to cut up these well-built gravel roads, doing great damage and causing heavy expense for repairs. In the spring season, especially when the frost is thawing out and the roads are soft, heavy loads do great damage. In order to prevent such injuries, the legislature of Indiana has passed a law fixing the limit in pounds to wagon loads, and requiring also broad-tired wagon wheels instead of narrow tires which cut into the gravel. A fine also of $50 or more is imposed upon teamsters who violate this law, and road commissioners in different counties are authorized to arrest and bring offenders to trial. In spite of these laws, however, and fines, much damage is done to gravel roads by heavily loaded wagons. It is not unusual to see log wagons heavily laden, or oil wagons of the Standard Oil Company, and other well-loaded vehicles, travelling over these well-gravelled roads.

The advantages of the free gravel road system to the farmers and to the city of Crawfordsville are very great. Farmers are able to travel to town in wagons or buggies with great ease, and without mud at all seasons of the year. They can haul their grain and other farm produce at any time when it is convenient. On Saturdays and holidays, especially, farmers and their families flock to town for their weekly trade, and they can travel many miles in a very short time over such excellent roads.

Another advantage of the free gravel roads is the great help they give in the establishment of town-

ship schools, or what are known as consolidated schools. Instead of five or six small country schools, scattered over the township, in some townships one large, two-story brick building with four rooms is built for the whole township. Four covered wagons or busses are regularly employed to carry the children from the more distant parts of the township to school, and it is necessary to have good roads for these wagons. In this way the country children are supplied with a first-class graded school in a good building, well heated and ventilated. Some four or five of these township schools have been established in Montgomery County, and others will doubtless follow. It is expected, also, that these schoolhouses will become meeting-places for the community for entertainments, lectures, etc.

Another advantage of the free gravel road system is its assistance in the rural mail delivery. Wherever the gravel roads are established, the government arranges for the free delivery of mail to farmers. Each mail carrier has a small covered cart in which he moves rapidly over the country roads. Over bad, muddy roads it would be impossible for mail-carriers to cover their routes.

As one travels over these gravel roads into the country, one sees numerous telephone lines, as in a city street, built to connect the farmhouses with the city. A telephone line reaches nearly every farmhouse. In this way the farmers have instant communication with merchants, doctors, and other people

in the city, and on account of the good roads, can quickly procure assistance in time of need.

The gravel roads of Montgomery County connect with similar free gravel roads of the neighboring counties, so that one may travel on a bicycle, or in a carriage or automobile, rapidly from large town to large town. Indianapolis, of course, is the great centre for the gravel road system of the state.

From what has been said, it is clear that the township, county, and state have an important interest and duty in keeping up good roads.

Crawfordsville is also the centre for the railroads of the county. Three railroads, the Monon, the Big Four and the Terre Haute and Logansport cross the county in three directions, and connect Crawfordsville with the smaller towns in the county and with neighboring county-seats in other counties, and with Indianapolis, Chicago, etc. Over these railroads are shipped the grain and cattle and other products of the county to the great centres of trade, such as Indianapolis, Cincinnati, Cleveland, etc.

Most of the cities of Indiana are county-seats like Crawfordsville, and have a similar system, more or less complete, of gravel roads spreading out into the county. The same is true in many other states north and south, east and west.

Two electric lines have been projected to connect Crawfordsville with other villages and cities. Many of the larger county-seats of Indiana are already supplied with one or more electric car lines. These

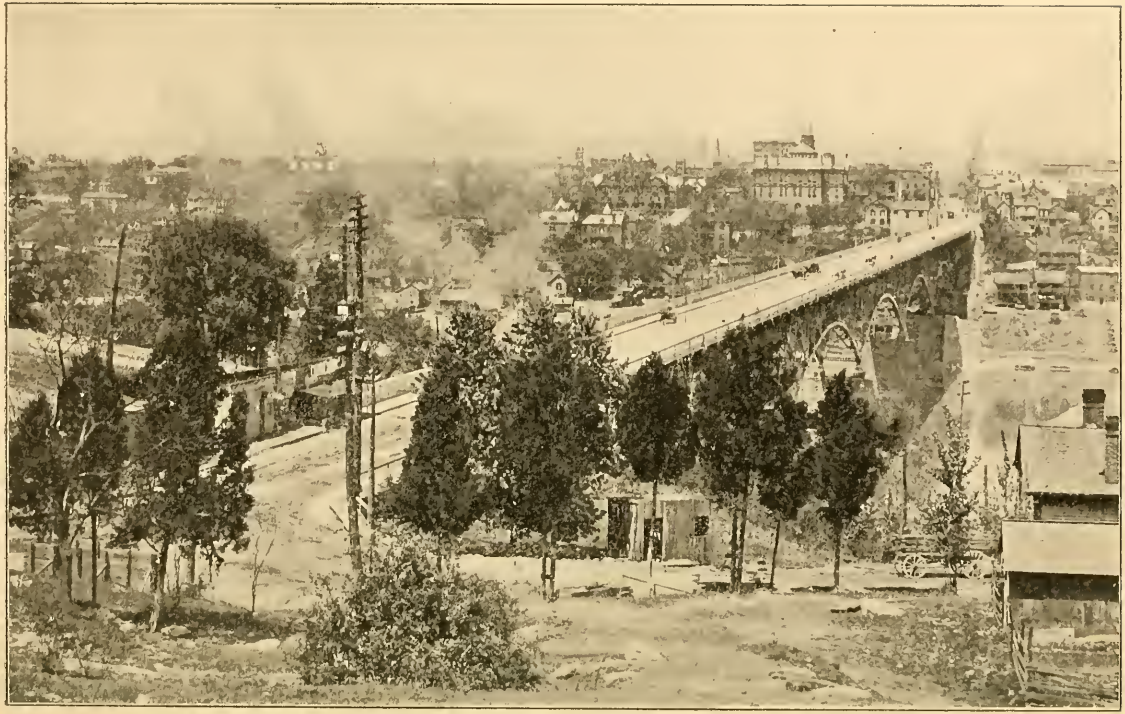

Fig. 17.

View from the Knoxville Bridge across the Tennessee River.

electric lines also bring many of the farm places into quick and easy communication with the cities.

At the county-seat it is not difficult to get a map of the county which gives clearly the system of roads radiating from this centre, and this will prove valuable to the teacher and the class.

### THE KNOXVILLE BRIDGE (OUTLINE)

1. View of the river valley, hills, etc.
2. Boats and barges on the river.
3. The lime-kilns.
4. The rafts and lumber mills.
5. The marble quarries.
6. The court-house. House of Farragut.
7. The Knox Landing and village creek.
8. The University.
9. The waterworks.
10. Road to the village.
11. The mountains. Great Smokies.
12. Comparisons.

### The View from Knoxville Bridge

The chief business street of Knoxville, Tennessee, crosses the Tennessee River toward the southeast on a high bridge. From this bridge a remarkably good view of the river valley and city can be had.

The bridge is a solid structure built on five or six great stone piers, and rises a hundred feet or more above the river. It is as broad as a street, well paved, and has spaces for wagons, street cars, and foot-passengers.

The wooded hills, sloping up from the river and covered in part by heavy forests, rise about four hundred feet above the river. The lower hills and intervening valleys upon which the city is built lie on the northwest. There is no low bottom-land along the river, but on both sides the slopes rise somewhat abruptly. The general view both up and down the valley has a somewhat mountainous aspect, as rounded or pointed hills are seen in the distance which resemble mountains.

A steamboat pushing a large barge or flatboat comes puffing up the river, and passing under the bridge proceeds to the stone quarries above. A small steam-launch carries excursionists up and down the river, and an occasional rowboat passes across or up the stream.

A little below the north end of the bridge is a cluster of large, round lime-kilns. The smoke or the steam is issuing from the top of one of them, and the sloping tramway on which the limestone rock is carried in trucks from the boats in the river to the lime-kiln is plainly seen. Farther up the river are limestone quarries, from which stone is loaded upon flatboats and floated down to the kilns, where it is burned and then used at Knoxville for plaster, mortar, etc.

On the other side of the river are numerous rafts of logs, which look as if they had been stranded on the high sloping sides or clay banks in time of freshets. Looking just above these we may see piles of lumber

and a large sawmill, which is engaged in converting these logs into valuable lumber. The logs come in rafts from the forests near the river banks farther upstream. About four miles above Knoxville are also marble quarries, where marble slabs are gotten out, placed on flatboats, and floated down to Knoxville, where they are sawed into sections, polished, and used in furniture or for building purposes. Back from the river also are found great marble quarries, where building materials are gotten and shipped by rail. These marbles are very hard, almost like granite, are quite costly building material, and are of varied colors, as pink, cream-colored, striped, red, etc.

Just beyond the north end of the bridge is the county court-house, and in front of it stands a marble monument to John Sevier, the pioneer Indian fighter, and the first governor of Tennessee. Close by this is a stone tablet marking the spot of the first blockhouse, the earliest defence of the pioneer settlers.

On the north side, and a little above the bridge, a deep valley between the hills sends a small creek into the river. At the outlet of this creek is a small flat spot which was used by the earliest settlers as a landing-place, and was called Knox Landing. Here the first houses were built, and then, as the village grew, stretched back into the valley of the creek and up the hillsides. In time it came to be known as Knoxville.

Just above this valley, on the hill slope next the river, is a log hut, which was the home of Farragut as

a boy. The hut has been lately shingled and put in repair, so as to protect the logs from decay.

Two or three blocks farther down the river on the west side are seen the buildings of the University of Tennessee, on the top of a hill some two hundred feet above the river. It is here that the great Summer School of the South is in session, and students from all the Southern States are gathered. The university was founded more than a hundred years ago.

On a still higher hill to the north, whose sloping sides are covered with houses, is the great water-tower and waterworks. The water is pumped from the river above the city into large tanks, where it filters through six feet of sand, which takes the yellow color and impurities out of the water, so that it comes out clear and clean.

The road across the bridge branches in two directions, in which lie two villages, and leads out through the valleys. One of these villages on the sloping hillsides is devoted to truck-farming, and supplies vegetables and fruits to the city market. The whole county in this direction is broken up into little hills and valleys, stretching away eastward toward the mountains.

On any clear day from the banks of the river near this bridge, one may see the dark ridge of the Great Smoky Mountains of North Carolina, somewhat dim in the blue haze, but still plainly in sight, and rising far above the nearer ranges of hills and mountains.

A few only of the interesting and instructive

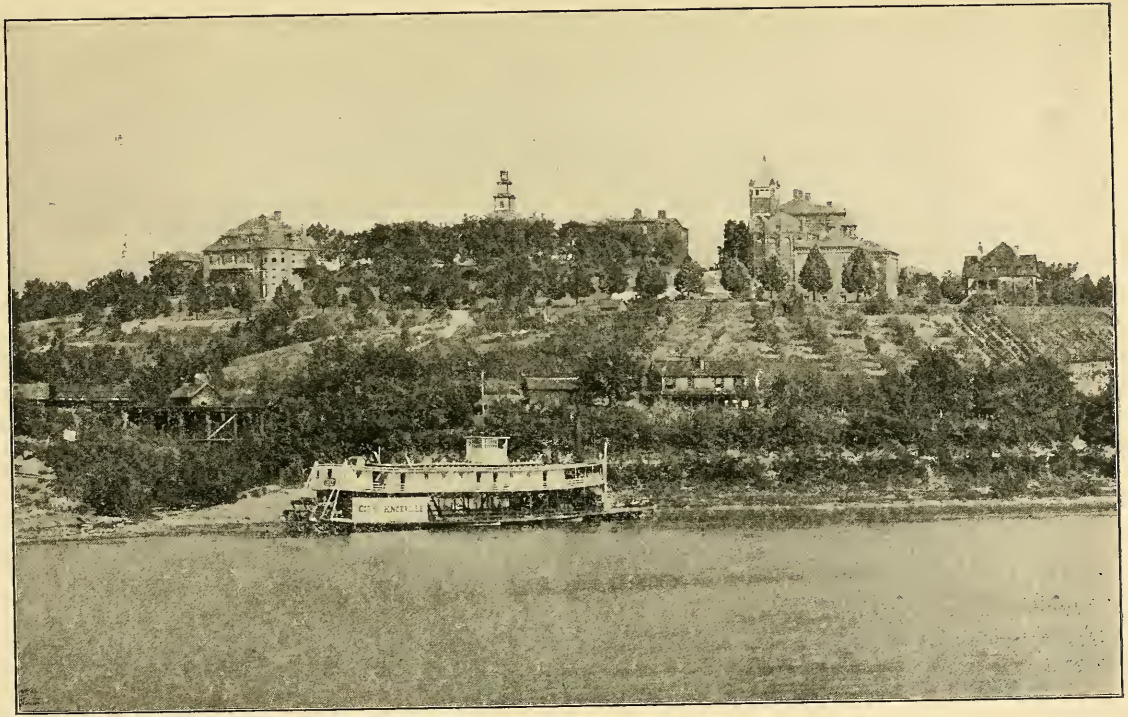

FIG. 18.
The University of Tennessee.

objects which can be seen from this bridge are thus described. There are also churches, factories, public buildings, and hilltops to be seen in a broad panorama. It is profitable to take two or more excursions to this spot at different seasons, to locate the roads leading into the country, the railroad bridge crossing just below, and the trains going east, and the course of boats and steamers with their cargoes down the river southwards.

There are many similar points of view from bridges across rivers in different parts of the country. At present we recall especially the following, the bridge across the Mississippi River just below the falls at Minneapolis. It is high above the river, spanning the gorge and viewing the falls, the University of Minnesota, and the city. Ten miles below the high bridge at St. Paul offers an equally striking and varied prospect or group of views. The great bridge at St. Louis, the high bridge across the Mississippi at Clinton, Iowa, at Winona, Minnesota, and at other cities, presents in each a grand panorama of river, wooded bluffs, and city. The great suspension bridge across the Niagara River below the falls, the New York and Brooklyn Bridge, are also notable illustrations. The bridges at Montreal, the London Bridge across the Thames, easily recur to mind. In a great number of villages and towns all over the country such a bridge excursion is possible, and is a good type of such things the world over. Such an excursion as the above described may be sometimes made within the limits

of a school period of an hour, or just after school, and the materials gathered furnish material for school treatment for two or three lessons.

## Trip to Tower of Montgomery Ward Building in Chicago

With some children we were carried in elevators to the top of the tower of the Montgomery Ward building, which stands on Michigan Avenue near Lake Michigan, three blocks south of the mouth of the Chicago River. The top of this tower is three hundred and ninety-four feet above the sidewalk, and the view from the railing near its top opens up some of the most striking sights of Chicago at the centre of its business activity.

One cannot see very far in any direction because of the smoke which droops down like a thick fog over everything. Even toward the lake the sky is clouded with the dark pall of smoke upon quiet days, when the wind cannot blow it away, and one can just see at times the lighthouse and breakwater. On the east, and only a block away, is the edge of the lake or inner harbor, which is a protected part of it, where ships may float at safe anchorage. The passageway through which the big lake vessels are hauled out by little puffing tugboats to the open lake is clearly seen. The long stretch of breakwater on the northeast is seen, and beyond that an occasional glimpse of a lake vessel may be had. On a

clear day may be seen the cribs of the water department, which are from two to four miles out in the lake, but often the smoke hangs so thickly over the city and the shores of Lake Michigan that nothing can be seen more than a mile away.

In the harbor are noticed two large steam dredges, each supplied with an iron shovel, upon the end of a great beam which reaches down into the dirt of the harbor bed and scoops up a load which is lifted and dumped into a flatboat. Smaller boats, sailing craft, and steamboats are also anchored or moving to and fro in the harbor.

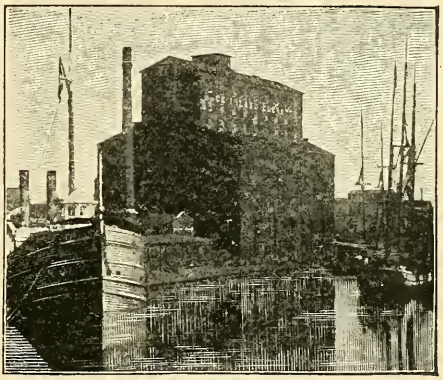

FIG. 19.
A huge grain elevator near the waterside.

At the mouth of the Chicago River are some large warehouses and grain elevators, and close under their sides are several large lake vessels loading with grain. This grain is brought to the elevators in trains of railroad cars, taken up into the elevators, and then sent by chutes into the holds of the vessels. Just south of these elevators are the freight houses and yards of the Illinois Central Railroad, covering several acres of ground. A great causeway for wagons and drays

passes over the long lines of cars which here fill nearly forty parallel tracks, and reaches a dock where vessels are loaded and unloaded. This is perhaps one of the best places to see the connection between the terminals of the great railroad line and the steamboat freight line. As one's eye follows the course of the river into the city, many large lake vessels are seen along its banks and wharves.

The tracks of the Illinois Central extend southward along the lake shore a mile to the great passenger depot, which can be dimly seen through the smoke. The tracks of this line have been sunk about twelve feet below the level of the lake front, and great causeways lead over these tracks to a broad strip of what was once lake, but is now being filled up along the lake front to form a park. Great heaps of dirt and rubbish are being piled up in the shallow water, and in a few years the whole will be raised to a safe level above the lake, and covered with grass and trees. At present, just below us on the lake front, stands the low brick building of the temporary post-office, which has been for several years the centre of the vast post-office business of Chicago.

A few blocks to the south, on the lake front, stands the Art Institute, which is devoted to fine art in the form of painting and sculpture. It may seem strange in the very centre of this smoke-begrimed city to see a beautiful building devoted to the choicest specimens of fine art in painting and marble. One block to the north stands the city public library, also a very fine

building devoted to books and scholarship in the very centre of the busiest trade by land and water.

Directly to the south, some five or six blocks away, is seen the Auditorium Hotel, in whose tower the chief of the weather bureau for Chicago makes his observations. To the southwest is seen the vast dome of the new post-office building, which is now nearing completion. Only a few blocks to the west stands the court-house and the city hall, hidden from sight by the thick smoke or by the tall sky-scraper buildings. The Masonic Temple, largest and tallest of them all, seems almost as tall as the tower upon which we stand, and nearer to us we see the great buildings of Marshall Field. The whole region immediately west of us is filled with towering buildings, such as can be seen nowhere else in such abundance, except at the lower end of New York City on Manhattan Island. From our high perch in the tower we can look down upon the highest of these buildings, as might a bird flying over the city. On the tops of these largest buildings are seen great tanks which are kept filled with water, pumped into them from below. These are a protection against fires, and for use in other ways. In case of fire such a great tank of water at the top of these buildings ready for immediate use, must be of great value.

Far below us on Wabash Avenue, one block to the west, we can see the trains of the elevated railroad as they move in both directions around the great loop, and are at this very hour carrying thousands of passengers in four directions, to distribute them toward

the outskirts of the city. At the same time we can see the electric and cable cars moving in both directions upon almost every street. Automobiles spin along, loaded drays and wagons, bicycles, busses, and carriages throng the streets, while many hundreds of people on


FIG. 20.
In a busy Chicago street.

foot are seen, like so many pygmies, moving along up and down.

As one closes his eyes to listen, he is almost surprised at the great tumult of noises which rises to the high point upon which we stand. Railroad trains and locomotives are constantly passing, the rattle and din of carriages and carts, the street cars and elevated trains, the hammering of workmen upon the great iron frames of new buildings near, and a multitude of other noises produce such a tumult of sounds, that conversation is almost drowned.

The general view across the smoking city, on account of the thousands of smoking chimneys and steam vent pipes, might easily make one think that he stood on the brink of a volcano, or that the city was just breaking forth into one great conflagration.

Much has been said in the past few years about the smoke nuisance in Chicago, and there are severe ordinances and fines against it, but as one stands on a windless day on the summit of this tower, the one convincing fact is that Chicago is smoke overwhelmed.

The region just west of the tower about the elevated loop is the centre of the great retail trade. Here are seen the great department stores, where not only the people of Chicago, but thousands from the neighboring towns, come to shop. At all times these immense department stores are well filled with busy throngs of people; but in the weeks before Christmas, such crowds of people swarm into these beehives of trade that it is almost suffocating, and it is quite difficult to get proper service.

At the northeast sides of the loop, and about the mouth of the river, is located a part of the heavy wholesale business. Here the streets are so full of loaded drays and wagons that passage is often obstructed.

Sights somewhat similar to those briefly described above may be seen from many other high buildings in Chicago. A visit to the top, or even some of the

upper stories, of any high building will give a lookout of a similar kind.

In other cities, of course, the same opportunity may be had, as in Cleveland, St. Paul, Boston, San Francisco, Galveston, New York, Savannah, Cincinnati, etc.

## OTHER COMMERCIAL TOPICS OUTLINED

The Local Town or Village as a Trade Centre.

1. Chief streets and roads leading into the country.
2. Products brought into town by wagon, as grain, hay, meat, wood, stone, live stock.
3. Goods carried into the country from the town, as machinery, dry-goods, groceries, lumber, coal, oil, etc.
4. Goods shipped into or out of the town by railroads or by boat.
5. Number and direction of railroads, rivers, etc.
6. Electric lines reaching into the country.
7. Chief factories that ship goods out of the town.
8. The town as a centre for railroads and wagon roads. Map.

A Freight Office or Station.

1. Variety of goods stored at a freight station.
2. Freighting by the car-load.
3. Expense of freighting by the car-load and by the hundred pounds.
4. Goods received for sale in the town.
5. Goods shipped out from the factories of the town.
6. Other modes of sending goods by express and by post-office.

A Grain Elevator.

1. Grain brought by wagons.
2. System of elevating grain by belts and cups.
3. The bins for storing grain.
4. Loading cars from the chutes.
5. Use of elevators along railroads and docks.

A City Market.

1. Special days when the market is open.
2. Different portions of the market for vegetables, fruits, meats, fish, etc.
3. The hours of marketing and the throngs of people.
4. Where the produce comes from.

A Visit to a River Steamer or Ocean Liner.

1. Size and arrangement of the steamer.
2. Passenger deck; state rooms; dining rooms, etc.

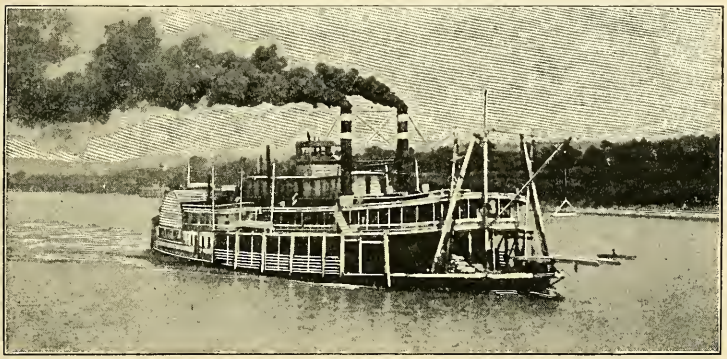

Fig. 21.
A river steamer.

3. The freight room on lower deck; goods shipped by steamboat.
4. The engines and wheels or screw.
5. Towns between which the steamboat plies; expense of freighting compared with that by railroad.
6. Visit to an ocean liner in the same way.

A Canal-boat and Canal-lock.

1. Visit to a canal-boat loading; goods freighted in this way.
2. Mode of propelling a canal-boat.
3. Size and capacity of a canal-boat.
4. The lock; its walls and gates.
5. Passing the lock.

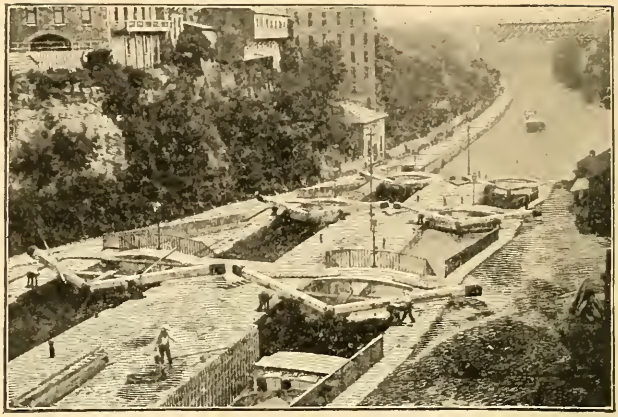

FIG. 22.
The Locks in the Erie Canal at Lockport.

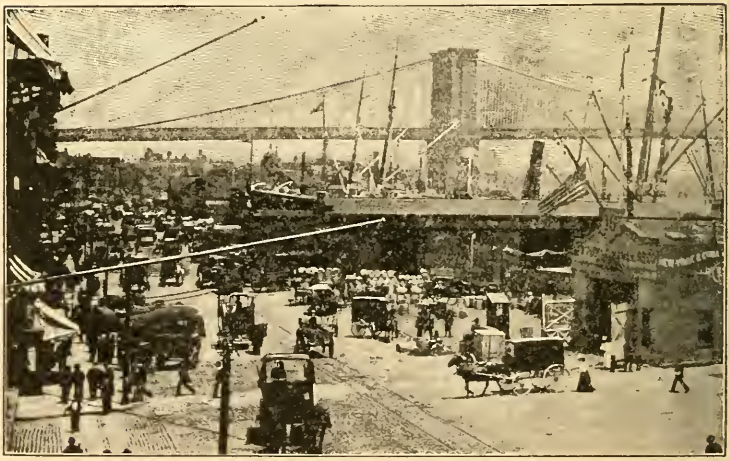

FIG. 23.
A scene at the docks in New York City.

A Visit to the Shipping Docks.

1. Modes of loading and freighting vessels.
2. Goods loaded and unloaded.
3. Machinery for hoisting goods from vessels.
4. Vessels to and from different points.

A Ferry-boat Ride at New York.

1. Trip from Desbrosses St. Station to the Pennsylvania docks in New Jersey.
2. Various river-craft seen, boats, ocean liners, war vessels, railroad ferries, tugs, launches, rowboats, schooners, dredge boats, barges, etc.
3. View of New York City from the river; the great buildings; long lines of docks.
4. Docks of the great ocean steamship lines.

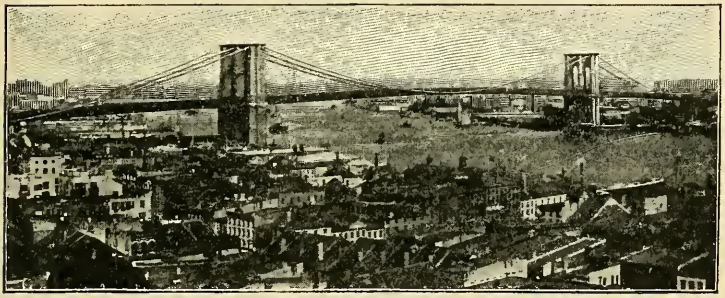

Fig. 24.

Brooklyn Bridge in New York City.

The Brooklyn Bridge.

1. Length and size of the bridge.
2. The great piers and cables.
3. Various passageways for car lines, wagons, and foot-passengers.
4. Views of New York and Brooklyn from the bridge.
5. The shipping in the river.
6. Construction and cost of the bridge. Its value and utility.

A Trip on the Elevated Road.

1. How the roads are built on iron supports.
2. The stations and their frequency.
3. The speed of movement compared with street cars and railroad trains.

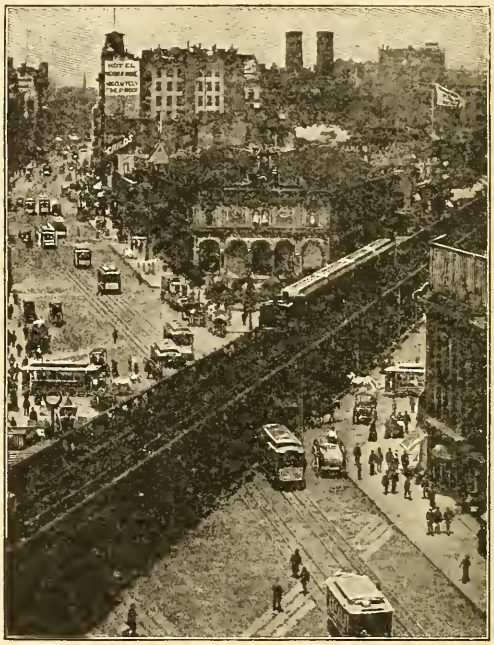

Fig. 25.

An elevated railway in New York City.

4. Views of business blocks and busy streets.
5. Views of churches, hotels, parks, etc.
6. Great difference in buildings in different parts of the city.
7. Crowded travel in the business part of the city.
8. Convenience of elevated roads for rapid transit.

## CHAPTER IV

### GARDEN, FARM, AND DAIRY

### Excursion to a Nursery

Near the schoolhouse at Normal, Illinois, is a nursery where fruit trees, shade trees, ornamental bushes, and small-fruit plants are cultivated and sold to growers.

In April an excursion is often made with the children to the packing grounds of this nursery. At this season the nurserymen are very busy packing the young trees and plants for shipment to many parts of the country.

The children notice large pine boxes some twelve feet long, and three feet square at the end. Straw is thrown into the bottom of the box, and then the apple trees, two or three years old, are wrapped at the roots with wet moss and packed into the box. When the box is full the whole is drenched with water, so as to keep the roots damp during the time of shipment. Wagon-loads of these boxes are driven to the station, where they are freighted to all parts of Illinois and neighboring states.

Sometimes a small consignment of plants or trees is wrapped first in moss, then in straw, and the whole

carefully bound with strong cord and shipped thus without boxing.

The straw for packing is obtained from the farms near by; but the fine moss, which holds moisture and keeps the roots damp, is obtained from the swamp lands of Michigan.

In the packing grounds the children see thousands of young trees, apple, pear, peach, cherry, and shade trees, closely packed together with their roots in the dirt, having been collected from the nursery fields and thus "healed in" in readiness for shipping. Evergreen trees, lilacs, rose bushes, hedge plants, and others are also kept in abundance upon the packing grounds.

In late winter another excursion can be made to the long cellar-like houses where the grafting and budding of young fruit trees are carried on. The young seedlings are raised by thousands the preceding summer, and upon the roots of these the choice kinds of fruit are grafted or budded. The process of cutting and wrapping can be learned, and in the trees a year or two older the effects of the budding or grafting can be seen. In this connection children may learn how our domestic fruits have been developed and how varieties are obtained and propagated.

The apple seeds used for raising seedlings are brought often from Europe, where they are obtained from the pulps of apples used in the cider-presses.

A practical lesson is learned upon these excursions as to how to plant and to care for young trees. In

connection with arbor day this is the best mode of encouraging the planting and care of trees.

Spring or early fall is also a good time to go through the nursery fields, to observe the cultivation of various fruit and ornamental trees, and to notice how rapid is the growth of young plants.

In the discussion and reproduction of the main facts learned upon these excursions, the value of the nursery to farmers and fruit-growers, as a necessary source from which to obtain young trees and plants of all kinds, is emphasized. In the prairie and treeless regions of the West and in fruit-growing regions, the importance of the nurseries in the last thirty years has been very great.

Children may be led to discriminate in their observations between apple, peach, pear, and cherry trees, so that they can recognize them in later observations; also between the kinds of shade trees, as maple, box-elder, elm, oak, cottonwood, etc.

### The H. B. Gurler Dairy, De Kalb, Illinois

We visited one of the best dairies of northern Illinois on the Clover Farm of H. B. Gurler, about three miles southwest of De Kalb. On this dairy farm all the conditions for securing good, wholesome milk are carefully provided.

The farm itself is of 240 acres, and the whole herd of cows consists of about 175 head, which are housed in three large cow stables or barns. At any given

time about two-thirds of the cows are giving milk. In case of the young calves, the heifers are kept for future milkers, while the others are sold to cattle men or butchers. In a dairy it is desirable, of course, to secure cows which produce the largest amount of

FIG. 26.
The cow barn.

standard milk. Beef cattle producing a smaller amount of milk are gotten rid of to the butchers.

All cattle when brought into this dairy are tested by state officials for tuberculosis, and at regular periods the whole herd is tested. Cows found infected with this disease are killed, and half the expense borne by the state. This precaution is taken,

of course, to prevent the spread of tuberculosis among the people who use the milk.

A good share of the feed for these cows is raised upon the farm. This year 160 acres of corn were raised, cut up, and stored in six large silos, which are built in or near the cow barns. The corn, which is planted somewhat thick in the rows, is allowed to grow till it is just past the roasting ear stage, when a machine is used to cut it down and tie it in bundles. Being brought to the barn, it passes through a corn chopper, which cuts stalk, ears, and leaves into fine shreds, when it is lifted, by means of elevator band and cups, to the top of the silo, and dumped in. It is necessary to have a rich, palatable food for cows, which will keep them well, with good, hearty digestion, so as to secure a large amount of wholesome milk. The dairyman needs experience and wisdom in providing his cows with this kind of palatable, digestible food. During the spring, summer, and fall the cows are turned upon pasture, and as many acres as possible are provided for their use. In this respect the seasons vary greatly, and when grass fails, other food must be provided.

In order to secure pure milk, it is necessary to have pure drinking water. On the Gurler farm the cows are not allowed to drink from the creek which flows near by, nor from ponds, nor even from surface wells. Several deep wells have been bored, from 180 to 200 feet deep, and the water from these is pumped by a gasoline engine into large metal tanks, where the

cattle drink freely. When the water is cold, in winter, it is warmed by mixing it with heated water, so that the cows may drink more freely. This kind of watering of milk is quite satisfactory to the cows, to the consumer, and to the dairyman. On many dairy farms, where no special provision is made for clean water, the cows drink from ponds and sloughs, and the milk is made impure and disease-producing.

An up-to-date, modern cow stable is an interesting place to visit. One of the smaller stables of Mr. Gurler, on the upper floor, had thirty-three cows, arranged in three rows. The floor is a solid cemented pavement, which is thoroughly washed out and cleansed once a day with a hose and water. The water is pumped into large raised tanks, so as to supply a strong force to serve in this cleansing of stables. The stalls and walls are whitewashed twice a year to insure purity and cleanliness. This stable is also ventilated, so as to secure a constant stream of fresh air, even in the coldest weather, but it is snug and warm, having a hay-loft well filled above, and close sides. Cows to do well as milk-producers, must be kept in healthy, comfortable surroundings. The stall for each cow is small and narrow, with a feeding trough in front; the floor of the stall is well bedded with straw, with a trench at the back for waste materials.

The milking is done twice a day, at four in the morning and at four in the afternoon. In preparation for the milking the milk-pails are washed and ster-

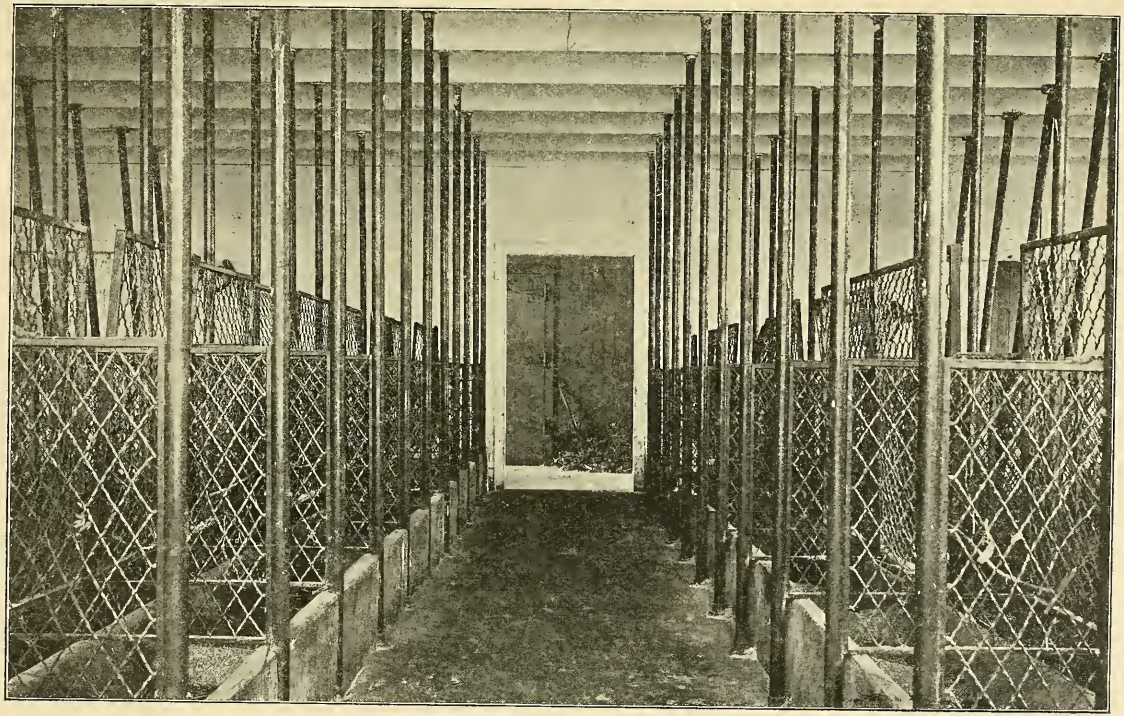

FIG. 27.

The interior of the stable for cows.

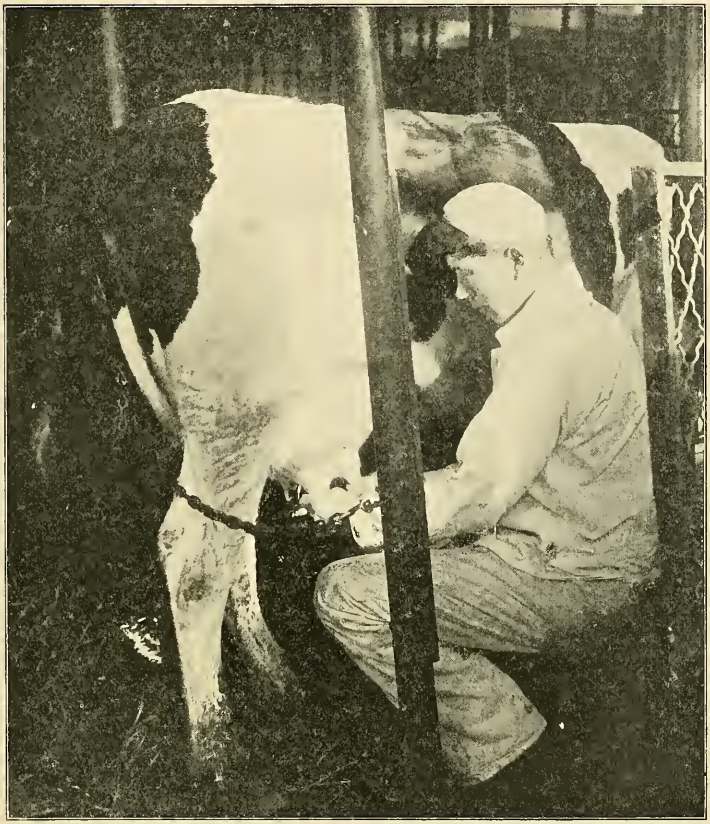

FIG. 28.
Milking.

ilized, so as to be clean and free from germs. The top of each milk-pail is then covered with a double thickness of cheese-cloth, and with a layer of sterilized cotton between, and through this triple cloth sieve

the milk passes in milking. The young man in preparation for milking puts on a clean white milking suit and washes his hands. The udders of the cows are first washed to clear away all dirt, and then the milker begins. He first strips away two or three times to clear the milk duct, and then begins to direct the milk into the pail. As soon as a single cow is milked, her milk is weighed and the record of the quantity put on a separate tablet, so that the exact amount of milk produced by each cow is kept, and if she does not prove profitable, she can be fattened and sold for beef.

The pail of milk is then at once poured into a large milk-can, which is kept closed, and when this is filled from the several cows, it is immediately carried to the milk-house.

At the milk-house everything is ready, under the direction of a foreman and helpers, to put it through a series of processes and bottle it up for shipment.

It is first poured into a large tin tank or receptacle, from which it flows through a pipe into a separator. This, by a swift centrifugal action, separates the cream from the milk, and each pours out through a tube into a tin trough leading into the cooler. If there is too much skim milk for the amount of cream, part of the skim milk is taken out, so as to keep the milk up to a standard of richness. In the cooler the milk passes into contact with pipes cooled with iced water, so that the animal heat is removed. The cooler pours the milk and cream mixed again into a

FIG. 29.
Weighing the milk.

Fig. 30.
The sterilizing room.

tin tank, from which it passes into a series of milk bottles just below. As the milk passes into these bottles the air bubbles and foam are allowed time to escape, and then the bottles are passed to two helpers, who place the cardboard stopper and the metal seal upon each bottle. This metal seal bears the stamp of the current date; for example, Nov. 6, 1903. The bottles are then packed in ice in the boxes, and are ready for shipment or hauling to the railroad station.

This room where the milk is handled has a cement floor, and water is used freely on the machines and on the floors, to keep everything in a cleanly condition.

In a neighboring room are two engines, one a gasoline and one a steam engine, which are used for pumping water from the deep well into the tanks for use in the milk-house and in the barns. These engines are also used for running the machinery of the milk room and to supply steam for the sterilizing room.

The sterilizing room is something like a large bank vault, which can be rendered air-tight by closing a heavy door. In this room, after they are thoroughly washed in tepid water, are placed the milk bottles, the tin tanks and tubes, and the parts of the separator machine (which has been taken to pieces and washed) — in fact, all the vessels through which the milk has passed in the milk room.

When all these bottles, cans, etc., have been ranged in the sterilizing room, the heavy door is closed, and

steam is admitted through a pipe from the engine, and gradually the room and its contents are subjected to a powerful steam heat. This destroys all germs and puts all the apparatus for handling milk in a perfect condition for future use.

The one purpose of all this care in the watering and feeding of the cows, in the cleanliness of the stables, in the milking process, in the handling of the milk in the milk room, in the sterilizing of the utensils, and in the sealing and icing of the milk before its shipment, is to secure milk *free from germs*, which can be swallowed even by little children and sick people, without conveying disease germs to the stomachs of those who use the milk.

Without constant care at every step it is easy for these germs to get into the milk — from the water given to the cows, from the dirt and filth of the stables, from the unclean hands and clothes of the milkers, from dirty utensils and impure water used in the milk room, and from large, more or less open cans, in which the milk is peddled about town.

When these sealed bottles of certified milk reach our kitchen doors, and are opened by the maid for use at the breakfast table, it is reasonably certain that no disease germs are to be found in the milk, that it is rich, sweet, and pure. Such milk is one of the best foods. It is claimed by good physicians that a supply of such pure milk has saved the lives of many infants, and that one reason why so many babies die in our large cities and towns is because of

the impure milk that has been supplied by careless dairymen and milkmen.

Of course milk that has been provided with all this care and expense for labor and machinery is worth more than the milk that is peddled about in large open milk-cans. Many people do not know the difference and buy the cheaper milk, though the danger from disease and sickness may in the end make it much more costly.

It is only in the last few years that people generally have begun to understand the very great dangers to health in the impure milk which is sold in such vast quantities. In New York City, for example, during the last summer, the regular officers of the health department have made a campaign against impure milk. Many of the large dairies have been inspected by officers from the city and certificates given them for furnishing good milk under healthy conditions. It is claimed that the results of this closer milk inspection by experts has greatly improved the milk delivered to New York City, and has saved the lives of many people, thus improving the general health of the city. It has been proven that the germs of typhoid fever, diphtheria, scarlet fever, and other diseases are often conveyed through milk, and that no one is free from these dangers who uses impure milk.

During the last summer Chicago also has been making a crusade against bad milk, and has established a closer inspection of milk by health officers.

When we consider that all the people everywhere, in town, city, and country, are equally interested in good milk, and that scarcely a family anywhere is free from the dangers of the carelessness and uncleanly habits of dairymen and milk venders, it is evident that we need everywhere a close inspection of dairies and the enforcement of right methods and standards for the production and handling of milk.

There is only one way to secure good milk; that is, to have it properly cared for at the stables, in the milk-house, and to have it delivered to consumers in sealed bottles.

The state government provides for inspectors who go to the different dairy-farms and test the cattle for tuberculosis. The local government of the large cities appoints officers whose business it is to inspect the milk brought into the city, and to visit the dairies in the country, examine their processes of caring for the milk, and certify to the good quality of the milk delivered. In this manner the unhealthful conditions prevailing in many of the dairies have been largely removed, and a much improved quality of milk has been brought to the city people. But large quantities of impure milk are sold everywhere, and there is still great need of further improvement.

### Excursion to the Creamery at Cornell

In an excursion to the creamery with a class of students at Cornell University, we observed the processes

of dealing with milk brought from the farm or dairy.

It was brought daily from the farm in large milk-cans, was received in the weighing room, and after straining was poured into a tank which stood just above the separator. In this tank the milk was

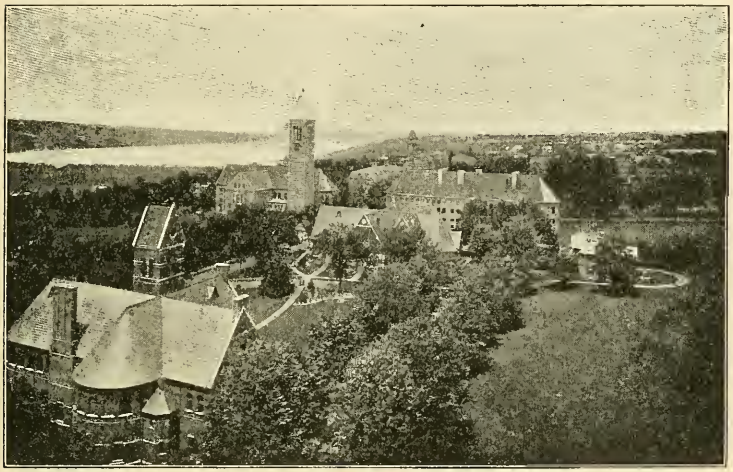

FIG. 31.

Some of the buildings of Cornell University. Lake Cayuga is seen in the distance.

cooled by contact with pipes in which cold water was kept flowing.

The separator is a skilfully devised machine for taking the milk from the cream. As the milk is whirled round in a rapidly revolving cylinder, the cream, which is lighter, remains in the centre, and is carried off in a separate tube and poured into a

can for cream. The milk, being heavier, is thrown to the outside, and is drawn off in another tube.

The cream thus collected in the cream can is then set in cold water and ice, where it is kept till ready for transfer to the refining tank.

The skimmed milk may be used for making Dutch cheese, for which there is a good demand in the market, or it is sent back to the farm to feed the pigs and calves.

When sufficient cream, about thirty gallons, has accumulated to make a good churning, it is all collected into a large tank, where the temperature is raised so that it will sour more easily, and, if necessary, a little acid introduced to help the souring process.

It is then transferred to the churn. When all is prepared, the churn is set into a whirling motion by a belt connected with the same engine that is used to run the separator. The churning usually lasts about thirty minutes. As the butter begins to come in the churning, the condition of the cream can be told by the appearance of the cream on some little glass windows in the side of the churn. When the butter is well gathered the glass clears up and shows that the process of churning is complete.

The churn is then opened and washed down with water, and the butter thus more collected into a mass. From the bottom a stopper is pulled out and the buttermilk drawn off, while the butter remains in the churn.

A butter worker can now be inserted into the churn, which is then closed up and the churn set in motion again. Or the butter is taken out of the churn and laid on a circular table which is called the butter worker. It is supplied with several fluted rollers, under which the butter passes as the table revolves. By this action the buttermilk is squeezed out of the butter and the salt is thoroughly mixed with it.

It is then taken to the printing machine, where it is pressed into moulds of a pound each, and receives the print of the creamery.

While being preserved for customers, the butter is stored on the shelves of the cold storage room, where, by reason of the cooling effects of ice, it is kept sweet and fresh. The cheeses made in the creamery are also packed away in the cold storage room.

About one-half of the milk received from the farm dairy is used for butter-making; the other half is sold as fresh milk to consumers.

A small steam-engine of three or four horse-power is used to run the churn and the separator when needed.

The floor of the main room of the dairy is cemented, and slopes toward a number of holes from which pipes carry off the waste water. In washing out the cans, rinsing the bottles, churns, and basins, the hose is turned on and the rinsing water is carried off the floor by these pipes. In this way vessels, churns, and floors are kept clean and wholesome, and that with but little labor.

A single person can look after the creamery and see that the butter is kept pure and good, both in the process of butter-making and in the preserving of the products.

## Local Study of Soils

Varieties of soil may be observed and examined in the home neighborhood.

In the neighborhood of the schoolhouse at De Kalb, Illinois, the topic on soils may be enlarged by experiment and observation as follows: Take the children out upon the campus and into the neighboring fields, to notice the depth and quality of soils. If a ditch has been lately dug, notice the depth of the black soil and of the yellow clay. If necessary, use a spade, and first dig a hole upon high ground, noticing depth of soil. Later sink a hole in the low, swampy campus near the creek, and see if the soil is different in depth and quality from that on the highest knoll. What reasons may be given for this difference? Notice what plants and trees grow upon the low, damp ground, and what upon the higher parts. In June or September observe the difference in the growth of corn or small grain upon the higher and in the lower parts of the neighboring field. The swampy places or sloughs have a very rank growth. What is the reason for these differences? In the natural grove on the campus examine the decay of the leaves and twigs and plants under the trees. Notice the dif-

ference, if any, between the soil in the woods and that upon the prairie.

In spring, at the time of the floods from melting snows or rains, take some of the muddy water from the creek or brook and let it settle. Where does the creek gather all this sediment? How large an area of land does the brook drain? Trace up the slopes as far as possible. When there are steep banks by the side of the creek, notice the cross-section of soils. Notice in places where the slopes are steep how the water washes out the dirt in little ruts and gullies. Why do the cultivated fields allow the soil to wash out more than pasture lands? How can the washing away of the soils be hindered along sloping fields? Notice how the farmers enrich the fields with fertilizers and sometimes sow grain fields to grass and clover. What reasons may be given for this? Notice the effect of draining the low lands or marshy places by tiles. What is the advantage of this drainage to the soil and crops?

In boring the wells for town water supply twelve hundred feet of strata were passed through. Find out what these strata were, and make a sectional view of them upon the blackboard. Twenty miles east of the town the railroad crosses the valley of Fox River, which has been washed out forty or fifty feet deeper than the prairie on either side. Make a diagram of this, and show where the rock quarries jut out at the sides of the valley, from which sources the limestone rock for foundations of houses is obtained.

### Irrigation and Farming about San Antonio

San Antonio lies in southwest Texas, in the edge of the arid belt. During some years there is sufficient rainfall to secure good crops of cotton, corn, vegetables, and grasses. But the rain is uncertain, and in other years the drought lasts for many months and crops

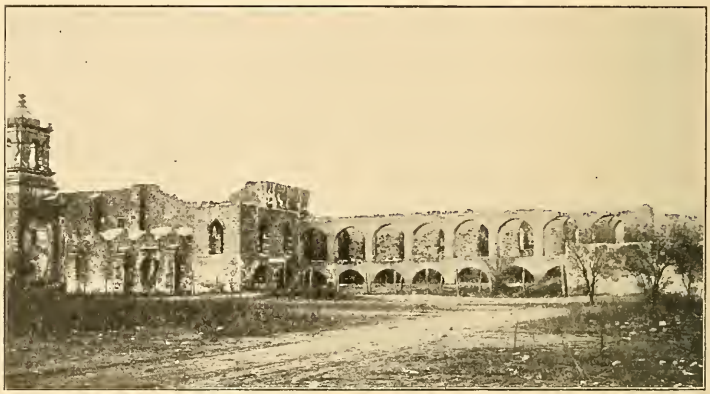

Fig. 32.
The San José Church and Mission.

fail. Several good excursions may be made to the farms and gardens about San Antonio to observe the modes of irrigation and agriculture.

Several of the old Spanish missions built in the early part of the eighteenth century, nearly two hundred years ago, were located along the small San Antonio River, and by means of ditches or canals water was drawn from the river and used to irrigate the rich, level lands about the missions. At these

missions the early Spanish settlers collected the Indians in large numbers and set them to work on the farms or in building the great walls and cloisters of the missions. The old ditches, used many years by the Spaniards for conducting water over the fields, may be traced along both sides of the valley. In one place the arches of an old aqueduct across the river are still seen. Of course it was the lower lands near the river which were brought under cultivation by the early Spaniards. At the present time there are several places near San Antonio where the water is pumped by engines from the river and conducted in large iron pipes to the level lands twenty or more feet above the river bed. While this is somewhat expensive, it secures a fruitful crop of vegetables, grasses, etc.

In recent years deep wells have been bored upon some of the farms near San Antonio, and an abundant supply of water thus secured for irrigating crops.

A visit to one of these wells is very instructive. About two miles from town we visited three of these wells.

The land is nearly level, and the soil is a very rich, dark-brown mould. Upon one of these farms, while riding along the country road, we saw the water pouring from a big iron pipe which looked much like a city hydrant. The owner explained that he had employed a well-digging company to sink a well at this spot. A large derrick was set up and a well was bored down through the dirt and rocks a thousand feet, when a very abundant supply of water gushed

up and rose in the pipe thirty feet above the surface of the ground. A tubing was lowered into this well, eight inches in diameter, and the top, just above the ground level, was closed and regulated like a hydrant. The farmer can thus turn on the water or shut it off at will, using only what is needed for his crops. The sinking of this well cost the farmer $3 a foot, or $3000, besides piping, ditching, etc.

He is able to irrigate 160 acres of very rich land from this well. The water has been used for a year and shows no sign of decreasing in quantity. Near by we observed the men at work digging and sacking a big crop of potatoes. On account of the Southern climate the farmer is able to raise three crops each year, and he claimed that the soil was so rich that good crops could be secured for several years without any fertilizing.

On this and the adjacent lands we saw crops of fine corn, sugar-cane, broom corn, cotton, hay, grain; garden vegetables, such as beets, potatoes, onions, cabbages, lettuce, melons; also orchards of figs, pears, peaches, and pecan nuts.

A man who was cultivating vegetables with a horse and plough said that he was paying a money rent of $25 an acre per year for the land he was using. This would indicate abundant crops and a good sale at San Antonio for garden truck, fruits, etc. The big city market house in San Antonio is an instructive place to visit in this connection, to see how many and varied are the products raised in the neighborhood of

San Antonio. A visit to the market house with a class will furnish opportunity to see many other fruits and vegetables, grains, and grasses peculiar to Texas. Close by the market house is the open square, called the Hay Market, where corn, fodder, hay, mesquite grass, and also melons and fruits are sold.

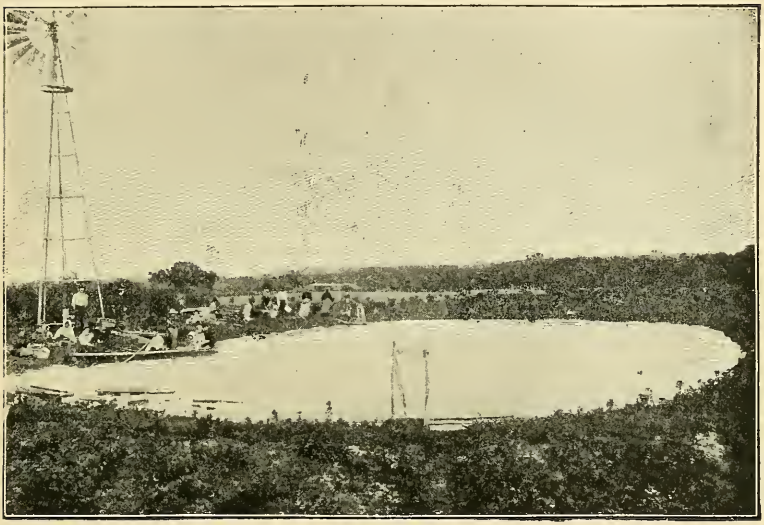

FIG. 33.
An irrigated fruit farm.

One of the farms in the neighborhood of the one described above has a large artificial reservoir. Near the wells on the higher part of the farm the earth was scooped out to form a pond, and an embankment about eight or ten feet high was formed around the whole. Two large artesian wells pour their water into this

basin till it is well filled. From this pond, which covers perhaps one and a half acres, the water is conducted by ditches over the farm. Trees have been planted upon this embankment and the water well stocked with fish, of which we saw an abundance. The level of water in the pond is several feet above

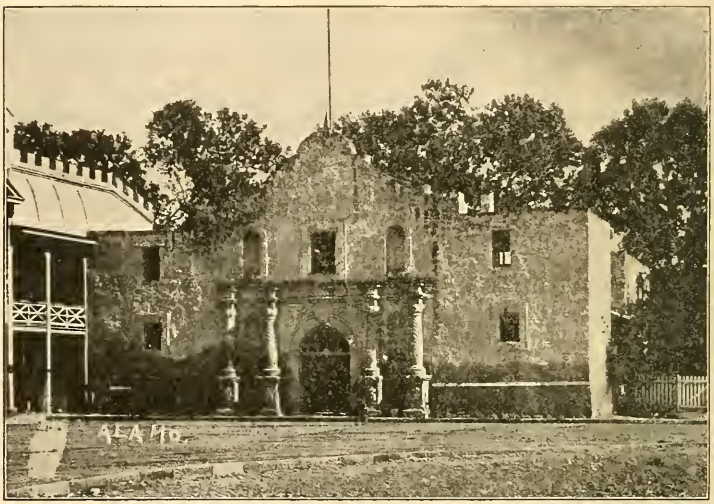

FIG. 34.
The Alamo, San Antonio.

the surrounding farm lands, making irrigation easy. Trees and orchards flourish on these irrigated fields. A fine residence, with beautiful gardens, orchards, and grape arbors, shows how profitable this system of irrigation is, although it is only four or five years since these wells were first put in operation.

It is a matter of uncertainty whether these irriga-

Fig. 35.
Threshing wheat.

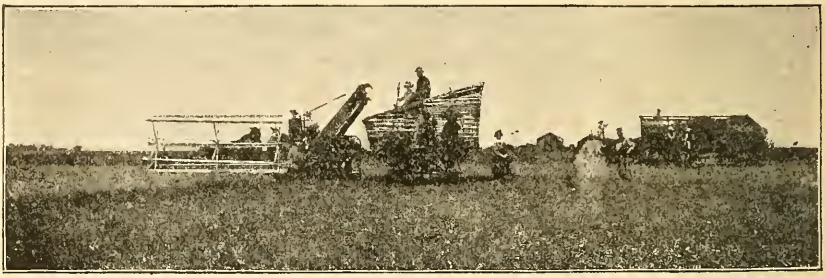

Fig. 36.
Harvesting wheat with header.

Fig. 37.
Harvesting wheat with self-binder.

tion wells will hold out and thus furnish permanent water supply for agriculture. Many people believe that the water supply is abundant and will not decrease, being fed by supplies in the mountains and rock strata which are practically unlimited.

The city of San Antonio, with sixty thousand people, furnishes at present a good demand for the products of the farms and gardens.

## OTHER TOPICS OUTLINED FOR THE GARDEN, FARM, AND DAIRY

Trips to the Garden in Spring and Fall.

1. Preparation of the garden for spring planting.
2. Vegetables raised in the garden.
3. Mode of cultivating onions, radishes, tomatoes, cabbages, etc.
4. The hotbed and its uses in early spring.
5. The use of fertilizers on the soil.
6. Effect of rain and drought.
7. Tools and machines used in cultivating.
8. The vegetable garden in the fall.
9. Gathering of the garden fruits and vegetables, and storage.
10. The market in the neighboring town and shipments to more distant places.
11. Effect of early frosts.
12. The labor and profits of gardening.

Trip to the Farm.

1. Putting in the crops in the springtime.
2. Rotation of crops.
3. Cultivation of grains; harvesting, etc. Granaries; cribs; barns; silos, etc.

4. Cattle and stock raising on the farm.
5. Hauling and shipping produce from the farm.
6. Farm work in winter.
7. Machines and cultivators used on the farm.

FIG. 38.

A farmyard scene.

THE HOTHOUSE.

1. Survey of the plants in the hothouse.
2. Construction of the hothouse.
3. Mode of heating and watering.
4. The soils used for various plants.
5. The cultivation of flowers in hothouse.
6. The cultivation of vegetables.
7. Modes of propagating geraniums and other plants.
8. The profit of raising hothouse plants.

THE ORCHARD.

1. The apple trees; planting and care; kinds.
2. Cherry trees; peach trees.
3. Injuries to fruit trees and mode of prevention.
4. The gathering and sale of fruits.
5. The marketing of fruits.

# CHAPTER V

## GOVERNMENT

### Local Town Government and the Court-house

*The local town government.* — Town councils elected by the people are familiar to the children. They have charge of the streets, sidewalks, bridges, appointment and payment of the police, waterworks, gas or electric light plant, and expenditure for other purposes. The mayor of the town is also an executive officer who is directly responsible for enforcing the ordinances which are passed by the council. The justice of the peace in the village tries the cases which come before him under the law. We have, therefore, in the village, the law-making power, administrative authority, and the local judge for the trial of cases. Matters concerning which laws may be passed, as streets, bridges, etc., ought to be discussed; also the granting of licenses for the sale of tobacco and liquors; concerning bicycles, pedlers, the care of the poor and of tramps; concerning health, the amount of tax levy, and other matters. If the children live in a small city, or even in a larger city, these topics may be somewhat enlarged, and the importance of those just mentioned may be illustrated in a more striking way. This topic is also connected with the duties of the

local school board elected by the people, which administers the affairs of the schools, provides for the buildings and teachers, and the expenditure of money for the general purposes of education.

A second topic, well worthy of study, is that of the county government as centring in the court-house, with its county officers and their administration of county affairs. An excursion of the children to the court-house, including a visit to the court-room and to the offices of the county recorder where the titles to property in the town and county are preserved, is a source of excellent training. Who pays the expenses of the county government? The salaries of the county officers? The cost of the county court-house and the expenses of the county court? The topics which we have just referred to should be handled in the third grade or fourth as an essential part of the geographical instruction which embraces the leading topics of home geography.

### Springfield, Illinois

Springfield, the capital city of Illinois, lies near the centre of the state, with the prairies on the east and the woods bordering the Sangamon River on the northwest. Its chief importance is as a centre for lawmaking and government.

The capitol building sends its great dome up some three hundred and sixty feet into the air, and commands from the top a broad outlook over the rich

farms and forests of this region of Illinois. Within this building the massive structure of the central dome, with circling rows of columns rising story above story, is seen. The broad halls and spacious stairways are in harmony with the grand and massive architecture of the whole building.

The east entrance is between great pillars, from which rise, above, a series of lofty Greek columns like an ancient temple. The main central part of the building is flanked on each side by a broad wing, and the wings are so identical in form and detail as to give an almost perfect harmony of parts.

In the interior of the building, just above the great stairway leading to the Senate-chamber and House of Representatives, is a large mural painting representing George Rogers Clark in council with the Indians. This is an effort to commemorate the great event of Clark's conquest of Illinois, the most important fact in the early history of the Northwest.

In the south wing on the third floor is the chamber of the House of Representatives, where the more numerous and popular division of the state legislature meets each second winter to frame the laws of Illinois. Directly opposite to this, on the same floor, is the Senate-chamber, a much smaller room, as the Senate is a much less numerous body of men. These two assemblies of men, elected from all parts of the state, go to Springfield once in two years, at the time appointed in the state constitution, to take counsel and determine what laws are necessary for the gen-

eral welfare of the people in Illinois. Many very important matters are discussed and laws passed. The railroad fares are regulated by such laws, and the roads are forbidden to charge more than three cents a mile. Laws are also passed regarding railroad crossings, accidents, and loss of life on railroads, freight charges, etc. The state legislature also passes laws in regard to the manufacture and sale of liquors, and the licensing of saloons; in regard to state taxation for schools, and for streets, waterworks, and other public improvements; in regard to the punishment of criminals; in regard to insurance companies and other large corporations, regulating their method of doing business. The state legislature also provides by law for the state institutions, such as the State University, the five Normal Schools, furnishing money for buildings, teachers, and other running expenses. The state reformatories, asylums, penitentiaries, and orphanages are also provided for by state law, so that helpless people, as the blind, the feeble-minded, the deaf and dumb, and the insane are housed and taken care of by experts trained to such duties.

Game laws are also made for the protection of wild game at certain seasons, also the fishes in the lakes and rivers. Laws forbidding the employment of children in factories, and requiring them to attend school are adopted. There are laws in regard to adulterated foods, pure milk, and butter and meats. Also in regard to contagious diseases and public sanitation.

In order to make clearer the facts in regard to the legislature, the local representatives of the home district in the state Senate, and in the House should be named, and the time and manner of election explained. Each senator and representative in the legislature receives a salary for the time he is in the legislature, and an allowance for his expenses in travelling and living.

The bills must be approved by both Houses, and be signed by the governor before they become laws. The expenses of all the parts of the state government and of the state institutions are provided for by the legislature. The large amount of money needed for these purposes is raised by state taxation, according to state law.

The speaker of the House of Representatives is elected by the House, and he is usually one of the most influential politicians in the state. The lieutenant-governor presides over the Senate, and in case of the death of the governor takes his place.

As one enters the House of Representatives, he notices on the left of the speaker's chair a large portrait of Stephen A. Douglas, represented as standing and delivering a speech. On the right is a portrait of Abraham Lincoln, sitting at a table. These two men stand out as the most eminent political leaders in the history of Illinois — Douglas, the great leader of the Democrats before the war, and Lincoln, the Republican President during the Civil War.

A few blocks to the southeast of the capitol stands

the residence of the governor. It is a palatial home, standing in the midst of a spacious lawn. The governor of the state is elected once in four years by the people of the state. It is his duty to see that the laws passed by the legislature of the state are put in force. He appoints men to all the state boards which manage the state institutions, such as asylums, penitentiaries, and the state schools. He is commander of the state militia, which he may call out in case of riot or public danger. He also has much influence upon the acts of the legislature while in session, and may veto laws passed by the lawmakers if he thinks best, although a sufficient majority may pass the law in spite of his veto.

The city of Springfield is an interesting place to visit, as the home of Lincoln. It was in this city, then a small place, that Lincoln practised law many years before he was elected President. His old home stands there still, a two-story frame house, only a few blocks from the court-house. It is now owned by the state, and is occupied by a family that was related to the Lincoln family, and some objects of interest, in connection with Lincoln's life in Springfield, are shown.

A visit to the beautiful cemetery, a mile and a half northwest of the city, is of much interest, where, upon a hill surrounded by neighboring forests, stands the Lincoln monument. It is a square stone shaft rising from a large square foundation to a height of about one hundred feet. Two great stone stairways

lead up to the base of the main pedestal. An open doorway, protected by an iron gate, allows one to look into a room at the heavy stone casket where lies the bones of Abraham Lincoln. On the opposite side of the pedestal is a room containing some relics of Lincoln. One may climb by a circular stairway to the top of the monument and get a broad survey of the landscape and city.

There is probably no other spot which Americans visit with as much respect, except Mount Vernon on the banks of the Potomac.

Another place of considerable interest to the people of Illinois is the state camp which lies to the west of the cemetery.

When the state militia, with their officers, are called to Springfield, they set up their tents and go into camp on the spacious grounds of this encampment. Here the companies of the state militia, eight regiments in all, are called together once a year and put through their military drill. They enter into the full practice of military life, live in tents, keep guard, mess in army fashion, engage in target shooting, infantry, cavalry, and artillery drills. A large open meadow in the front of the camp furnishes ample drill grounds, and a fine oak woods just back of this supplies a choice place for an encampment. In July or August each regiment spends a week at this encampment, at state expense, enjoying all the pleasures of army life, plenty of good band music, an occasional speech by the governor, a great deal of attention from

the gentlemen and ladies of Springfield, who ride out in carriages each evening to witness the drills and hear the band, etc.

When the legislature is in session, every second winter, Springfield is a lively city. The big hotels are crowded with people, and the best boarding-house keepers have all they can do. At other times business is apt to be pretty dull. Yet at all times the presence of the governor and the state officials and their families gives some social distinction and life to the capital city.

The State Fair Ground, just at the northeast limit of the city, is each fall the centre of a week's busy exhibitions. There is a great display of fruits, vegetables, grain, and manufactured products. Also live stock from all parts of the state, and almost all the industrial interests of the state have here an annual display.

Springfield, partly from its importance as the seat of government and partly from its location in the midst of a rich agricultural and coal-mining region, has become an important railroad and commercial city. There are several large coal mines, a watch factory, extensive iron and machine shops, besides smaller factories of several kinds.

At the close a comparison may be made between the local government of the town or city and that of the whole state at Springfield. A year later a comparison of the state government with that at Washington will be very instructive.

## GOVERNMENT (OUTLINE)

The City Hall and Officers.

1. The building and its arrangements.
2. The mayor and his duties.
3. The council; their election; the work of the mayor and council in law-making.
4. The city police; their appointment and duties. The arrest and imprisonment of offenders.
5. The trial of cases in the police court.

The Fire Department.

1. Visit to the engine-house; the fire-engine, horses, hose-cart, etc.
2. Fire signals, and quick service.
3. Dangers of the work of firemen.
4. The hydrants and water power.
5. The hours and pay of the firemen.

The Waterworks.

1. The source of pure water for the city; artesian wells; distant reservoirs; tunnels and aqueducts.
2. The pumping stations; water-tower; the water mains and pipes.
3. The expense of supplying city water.
4. Uses to which the water is put; household uses; factories; fires; street-cleaning; lawns.

The Gas-works.

1. The ovens for producing gas; coke.
2. The gas-tank.
3. Piping gas through the city to stores, houses, and streets.
4. The use of gas in houses; dangers.
5. Other means of lighting and heating.
6. How the gas rates are fixed; metre.

The City Schools.

1. Various school buildings.
2. Expense of keeping up schools and schoolhouses.
3. The board of education; how chosen. Duties.
4. The compulsory school law.
5. Higher schools or colleges near by.
6. The State University.

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